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EDITOR'S NOTE

Elizabeth A. Little

After celebrating the Society's 50th anniversary in 1989 with chapter histories and other memorabilia, we return to site reports and other issues of contemporary archaeology in the Northeast and especially in Massachusetts. Our first article, by Catherine Carlson of Montague, is a welcome challenge to southeastern New England archaeologists to explore seasonality of coastal sites more rigorously than heretofore. Seasonality has long been a focus of interest among coastal archaeologists, and the faunal remains preserved in shell middens provide materials for analysis. However, whether shell middens represent year-round, seasonal or occasional visits is still an open question. An article by Alan Strauss of Providence demonstrates the wealth of information to be gained from site and collections inventory projects. Jonathan Pyle has sent us a report from Brewster describing useful archaeological activities which can be carried out in a library with a personal computer. Jerome Dunn of Plymouth has a longstanding interest in mammoths and mastodonts and is sharing with our readers the information he has gathered about proboscidean finds in Massachusetts. And, finally, both historic and prehistoric archaeologists working in Massachusetts need to be able to interpret the landscape and especially to recognize dams and diversions of stream courses that are common historic features along brooks and rivers. Stephen Straight of Deland, Florida, communicates his knowledge of two interesting examples of stream diversion due to water mill construction in Massachusetts.

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IN MEMORIAM: GEORGE S. GIBB, 1916-1989

Maurice Robbins

Dr. George S. Gibb, a member of the Massachusetts Archaeological Society since 1941, a trustee 1965-1971 and Secretary 1971-1974, passed away in Falmouth on April 12, 1989. Dr. Gibb was born in Attleboro, September 16, 1916, the son of the late John Laing Gibb and Helen (Sweet) Gibb and lived in Attleboro all his life. His first wife was the late Ruth (Ballou) Gibb and his second wife was the late Elizabeth (Nolan) Gibb. Besides his wife Hilma (Houlton) Gibb, he leaves two sons, two daughters, six grandchildren and three great-grandchildren. Dr. Gibb received a bachelor's degree from Tufts University in 1938, a master's degree in business administration from Harvard Business School in 1940 and a doctorate in commercial science in 1965. During World War II he served as a supply officer in the United States Navy in the Pacific theater. From 1946 to 1962 Dr. Gibb was on the faculty of the Harvard Business School and editor of the "Harvard Business Review." He was Director of Communications at the L. G. Balfour Company in Attleboro from 1977 to 1981 when he retired. Dr. Gibb was the author of The History of the Reed and Barton Company; The History of the Standard Oil Company; and The History of Saco-Lowell. He was an incorporator and a director of the Attleboro Industrial Museum and also a member of the first Attleboro Historical Commission. Just prior to his death, he had contributed an article on an early Cape Cod collector, Dr. Lombard Carter Jones, to the Bulletin (50:67-69).
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SEASONALITY OF FISH REMAINS FROM LOCUS Q-6 OF THE QUIDNET SITE, NANTUCKET ISLAND, MASSACHUSETTS

Catherine C. Carlson

INTRODUCTION

The Quidnet site (M52/65) is a shell midden located on the eastern side of Nantucket Island on a small freshwater pond approximately 0.8 km inland from the open ocean to the east. An excavation of ten contiguous 2mx2m squares was undertaken in 1976 and 1977 at Locus Q-6 of the site by the Nantucket Historical Association, from which a small sample of faunal remains was recovered. Full details of the excavations and analysis of associated artifacts, features, and stratigraphy are presented by Little (1983). Diagnostic artifacts indicate a Woodland period occupation, confirmed by radiocarbon assays of 1575 ± 160 B.P. (on bone) and 1680 ± 80 B.P. (on shell) (Little 1983:18; see also Little 1984).

The purpose of this report is to present the results of analysis of the fish remains recovered from Locus Q-6 of the Quidnet site (Carlson 1987), and to offer some further interpretation on the season of occupation of the site. The analysis of the Quidnet fish remains was undertaken as part of the on-going interest of Elizabeth Little and J. Clinton Andrews to understand prehistoric dietary patterns, marine subsistence, and the seasonal round for prehistoric Nantucket (Little 1983, 1985a, 1985b; Andrews 1986). The analysis of the fish materials also offered an opportunity to investigate a Nantucket Island faunal collection within the context of a larger study undertaking a survey of fishing strategies for prehistoric New England through faunal analysis (Carlson 1988b).

Previous analyses of Nantucket faunal collections include that by Waters (1965). In that report, sand shark (*Carcharias taurus*), sea sturgeon (*Acipenser oxyrhynchus*), and sea robin (*Prionotus carolinus*) were identified from the Ram Pasture site; and sea sturgeon from the Pocomo site. Unfortunately the faunal sample analysed was extremely small (total of six elements), and the sampling methods are not described, so it is difficult to evaluate the relative importance of the fish species in those sites, in comparison to Quidnet/Locus Q-6. Likewise, Bullen and Brooks (1949) note the presence of sturgeon (*Acipenser oxyrhynchus*) and sculpin (species?) at the Herracator Swamp site; and Luedtke (1980:114) notes that sturgeon (*Acipenser oxyrhynchus*), spiny dogfish (*Squalus acanthias*), and cod (*Gadus morhua*) were identified from the Quaise site. The sturgeon, sand shark, spiny dogfish and sea robin are warm season residents in Nantucket waters (Andrews 1973). Joseph Waters (Ritchie 1969) also identified the fish remains from six sites on Martha's Vineyard, presenting a faunal assemblage similar to that identified for Nantucket sites.

The other classes of faunal materials recovered from the Quidnet site have not been systematically identified. However, Little (1983) has reported that white-tailed deer (*Odocoileus virginianus*) and oyster (*Crassostrea virginica*) dominate the faunal collection, and that gray seal (*Halichoerus grypus*) and harbor seal (*Phoca vitulina*), along with fragments of turtle carapace (*Chrysemys picta* [Anders Rhodin 8/87, personal communication to E. Little]), bird, quahog, and other occasional shellfish species, are also present (Little 1983:27; 36-37).

Little (1983) has postulated a late fall, winter, and spring occupation at Locus Q-6 of

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the Quidnet site based on the presence of the gray seal remains, the present seasonal fluctuation of the water levels in the pond adjacent to the site, and the protected setting of the site. The analysis of the fish remains, which had not been identified at the time of publication, was hoped to add further to the interpretation of subsistence practices and seasonality at the site.

The faunal materials sent for analysis were recovered during excavation, using 6.35 mm (1/4") mesh screens, which tend to bias against the small fish species. This potential sampling problem is not unique to this site, but has been widespread in the Northeast where bulk matrix column samples are infrequently taken.

SPECIES IDENTIFICATION AND QUANTIFICATION

The total sample size consisted of 101 fish bone fragments weighing 16.2 gm. Of these, 27 fragments are identifiable to species, the remainder consisting largely of undiagnostic spines, ribs, and ray fragments (Table 1).

The species identifications on the 27 identifiable fragments were made by comparison to the author's modern comparative fish skeletal collection. These bone fragments consist of 12 cranial elements of bluefish (*Pomatomus saltatrix*), nine vertebral centra of spiny dogfish shark (*Squalus acanthias*), and five vertebral and cranial elements of an unknown small/medium sized species (Table 1). The unknown species was not in the

TABLE 1: FISH REMAINS FROM THE QUIDNET SITE, LOCUS Q-6, NANTUCKET

Genus/Species	Element (fragments)	Side	Count	Weight (gm)
Pomotomus saltatrix	cleithrum	R	1	1.2
Bluefish	epihale	R	1	0.2
	articulare	R	1	0.4
	premaxillary/teeth	L	1	0.1
	dentary/teeth	L	1	1.1
	dentary/teeth		3	0.5
	premaxillary/teeth	L	1	0.2
	epihale	L	1	0.1
	quadrate	R	1	0.5
	quadrate	R	1	0.2
Squalus acanthias Spiny dogfish	vertebral centrum		9	0.8
Gadus morhua Atlantic cod	otolith		1	2.0
Unknown sp.	vertebra		3	0.5
	cranial		2	2.4
Unidentifiable	miscellaneous		74	6.0
	Total:		101	16.2

author's comparative collection or that of the Museum of Comparative Zoology at Harvard. It can be stated, however, that this species is not from any of the major species of southern New England, i.e., cod, haddock, pollock, tomcod, flounder, longhorn or shorthorn sculpin, sea robin, mackerel, shad, alewife/blueback, sturgeon, wolffish, striped bass, salmon, scup, cunner, white perch, or freshwater yellow perch, bass, bluegill/pumpkinseed, or trout. In addition, an otolith (ear-stone) of Atlantic cod (*Gadus morhua*) from the site, photographed in Little (1983:43:L), is included in the total fish assemblage.

SUBSISTENCE AND SEASONALITY

Fish bone was recovered at the site from seven of the ten contiguous 2mx2m excavation squares (Table 1; Figure 1). This distribution indicates (with an admittedly small sample size) that fish bone have a wider site distribution than the other classes of vertebrate faunal remains, which were recorded in only five of the ten excavation squares (Little 1983:38-39). The overall quantities of shellfish and fish, along with the presence of seal remains, suggests a marked marine orientation to the diet and subsistence patterns at this site, although terrestrial species are present.

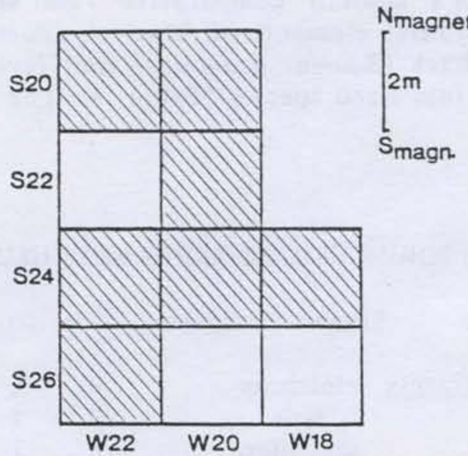

Figure 1. Excavation squares at Quidnet Locus Q-6 with fish bone indicated by hatchuring.

Inferences on the season of capture of the fish species represented archaeologically can be made based on modern migratory schedules and seasonal behavior of those species. The analysis of the growth rings in fish otoliths and vertebrae is not considered a reliable method for seasonality, based on extensive experimentation (Carlson 1988a). A warm season (i.e., June through October) pattern of fishing at the site is indicated by the dominance of bluefish and spiny dogfish in the assemblage, and by the paucity (only a single element) of Atlantic cod. Both bluefish and spiny dogfish have very restricted seasonal ranges in southern New England during the warm months. Atlantic cod are more abundant during the colder months of the year; the presence of large quantities of this species in other New England sites is interpreted as part of a cold season fishing pattern (Carlson 1986).

Bluefish (*Pomatomus saltatrix*)

Bluefish is a schooling species, found both offshore and inshore, sometimes travelling in schools of many thousands. It was reported in 1901, for example, that a school four or

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five miles long was observed in Narragansett Bay (Bigelow and Schroeder 1953:384). The largest recorded individual fish in American waters was caught off Nantucket in 1903 and weighed 27 pounds; but the general size of the largest fish caught is 10 to 15 pounds. Large schools of bluefish of this size would represent a considerable food resource to prehistoric fisherfolk.

These schools, however, are seasonal in nature since bluefish are warm water species that are rarely found in temperatures of less than 58° F. The earliest commercial catches reported off southern Massachusetts occur in late May, but it is not until late June that they work inshore in numbers. From information compiled by J. Clinton Andrews for the period 1875-1919, the arrival of bluefish at Nantucket has occurred as early as May 18 (1878) and as late as July 3 (1909) (Figure 2). Andrews (1973:30) notes however that, "The largest catches are made about the middle of September" on Nantucket.

During their inshore movement, small bluefish, known as "snappers," will run up into brackish harbors and estuaries all along the coast (Bigelow and Schroeder 1953:384). On Nantucket, these are plentiful in late summer in Nantucket Harbor (Andrews 1973:30). The larger ones, which arrive somewhat later, will come in only as far as the outside waters of the surf along beaches, and can be caught by anglers "surf-casting"; however this is possible only in "good" years (Bigelow and Schroeder 1953:384). Andrews (1986:46) has suggested that the fish most probably would have been speared from canoes by the Native American fisherfolk, and that most catches are made today by trolling from boats (Andrews 1973:30).

The bluefish completely disappear from the southern New England coast by early November (Bigelow and Schroeder 1953:384). For Nantucket, Macy wrote in 1792:159, that the bluefish were caught in great plenty from the beginning of June to the middle of September.

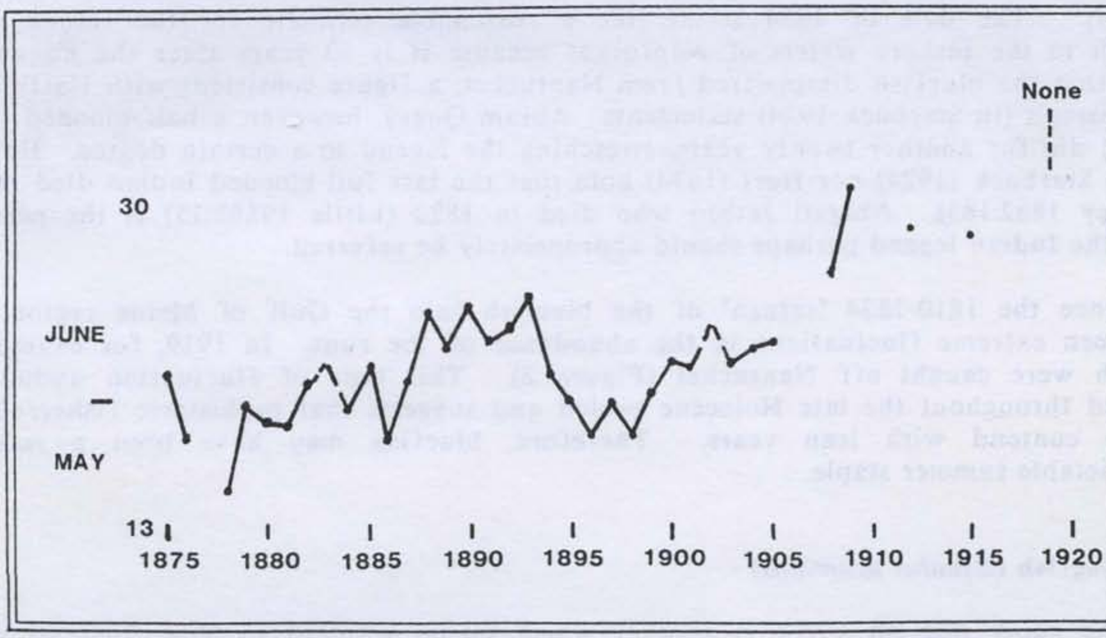

Figure 2. Dates of Annual Arrival of Bluefish at Nantucket (data compiled by J. C. Andrews 1982).

An interesting feature of bluefish migrations is the unpredictable nature of the runs. This would obviously be of concern to prehistoric fisherfolk reliant upon marine resources. It is known historically that the bluefish were plentiful off southern New England and Nantucket in colonial times, but completely disappeared, due to unknown causes, between the years 1764 to 1810 (Bigelow and Schroeder 1953:386). Macy (1792:159) stated that, "But it is remarkable, that in the year 1764, the very year in which the sickness ended, they [bluefish] all disappeared, and that none have ever been taken since. This has been a great loss to us." Macy's reference to the "sickness" is the Native American plague of 1764, of which there is an interesting legend relating to the bluefish that is reprinted in Starbuck (1924:614):

> In his little volume "Talks About Old Nantucket" [p. 46] Christopher C. Hussey relates the following legend concerning that singularly fatal illness among the Island aborigines - "When the 'Great Sickness' of 1764 .... carried off the Indians, from some cause, perhaps the action of some deep-lying law of the connection between all animal life, the blue fish, which had been plenty, suddenly disappeared from the waters around the Island. The Indian sage said - "When the houses of the red men are laid low, the blue fish will return." Whether from mere coincidence or nature's law it was so. Not far from the time of Abram's death [1854], the blue fish reappeared. I distinctly remember hearing two men say that there had been taken at Maddequet, that afternoon, two blue fish, the first, that with possibly an occasional exception, had been taken for nearly three quarters of a century."

The actual date of the return of the bluefish to Nantucket is obscure. Bigelow and Schroeder (1953:386) use historical fisheries records to show that the bluefish returned to the coastal waters off Nantucket in 1810, but are not recorded north of Cape Cod until 1837. In 1834 Hart (1834:3) relates the tale of a companion that, "The bluefish *have* returned [to Nantucket] within the present year [1834?] -- the *last* Indian lingers among us without the hope of issue [Abram Quary]...It is now more than three-score years [greater than 60 years] since the species was thought to have become extinct [emphasis in original]." The date of 1834 seems like a reasonable estimate for the return of the bluefish to the inshore waters of Nantucket because it is 70 years after the known date (1764) that the bluefish disappeared from Nantucket, a figure consistent with Hart's (1834) and Hussey's (in Starbuck 1924) statements. Abram Quary, however, a half-blooded Indian, did not die for another twenty years, stretching the legend to a certain degree. However, neither Starbuck (1924) nor Hart (1834) note that the last full-blooded Indian died in 1822 (Godfrey 1882:183). Abigail Jethro who died in 1822 (Little 1988b:15) is the person to whom the Indian legend perhaps should appropriately be referred.

Since the 1810-1834 "return" of the bluefish into the Gulf of Maine region, there have been extreme fluctuations in the abundance of the runs. In 1919, for example, no bluefish were caught off Nantucket (Figure 2). This type of fluctuation undoubtedly occurred throughout the late Holocene period and suggests that prehistoric fisherfolk also had to contend with lean years. Therefore, bluefish may have been a relatively unpredictable summer staple.

Spiny dogfish (*Squalus acanthias*)

The spiny dogfish shark is another warm season resident to New England waters. While the timing of their arrival to the southern New England coast varies from year to year, it is not until June that they arrive in numbers to the Massachusetts Bay region

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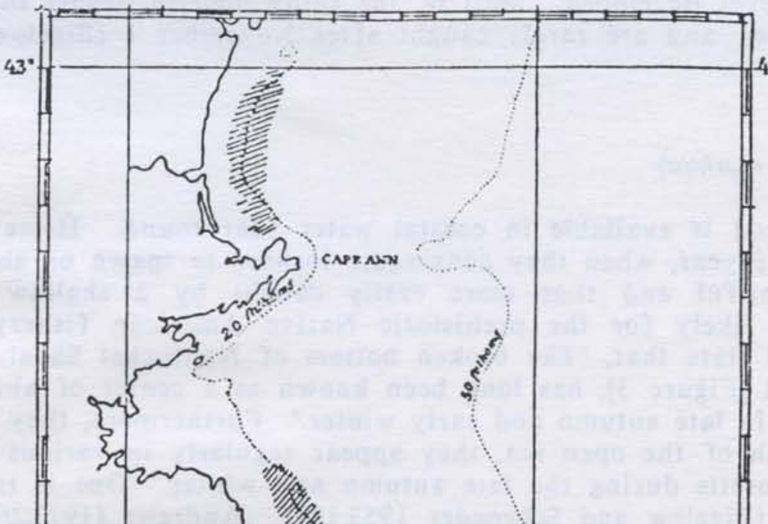

Figure 3. Chief spawning grounds of cod (shaded areas) in the western Gulf of Maine (enlarged from Bigelow and Schroeder 1953:192).

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(Bigelow and Schroeder 1953:49). On Nantucket, they arrive a little earlier, being most numerous in the spring, occasionally caught during the summer, and numerous again in the fall (Andrews 1973:15).

Compared to the rarity of other sharks in the Gulf of Maine, the spiny dogfish is known for its "obnoxious abundance." They are easily caught by baited hook and line in shallow coastal waters, and are therefore considered a nuisance to modern fishermen. Dogfish is described as a good-eating fish when fresh, although no modern commercial
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demand for it has ever developed. Most of the spiny dogfish depart the outer coast of Cape Cod by October, and are rarely caught after November 1 (Bigelow and Schroeder 1953:50).

Atlantic Cod (*Gadus morhua*)

The Atlantic cod is available in coastal water year round. However, it is during colder months of the year, when they congregate inshore to spawn on shoal ground, that they are most plentiful and thus more easily caught by a shallow inshore fishing technology such as likely for the prehistoric Native American fishery. Bigelow and Schroeder (1953:192) state that, "The broken bottom of Nantucket Shoals, east and south of Nantucket Island [Figure 3], has long been known as a center of abundance for ripe [spawning] cod fish in late autumn and early winter." Furthermore, they state, "while cod are essentially a fish of the open sea, they appear regularly in various river mouths in Maine and Massachusetts during the late autumn and winter. One is taken in brackish water occasionally" (Bigelow and Schroeder 1953:189). Andrews (1973:26) notes that cod are also plentiful on the grounds off Nantucket in April and May. Historical information gathered on eighteenth-century native economy on Nantucket indicate that cod were not fished during the months of June through September; and that Indian credits for codfish at the English trader's store were highest during October, November, April and May, with lesser cod-fishing activity from December through March (Bragdon 1986; Little 1981:15). This author suspects that winter storm activity probably reduced the number of days from December through March that the eighteenth-century Native American fishery, in small European-style boats, could have safely fished the Nantucket cod shoals.

Cod is a ground feeder, typically caught with baited hook and line from watercraft. Andrews (1986:45) notes that cod can "strand" on the outer beaches on Nantucket during the fall, and may have been collected for food in that manner also. The low incidence of cod at the Quidnet site is further evidence that the fisherfolk were not engaged in a cold season fishery. A site that was occupied during the fall, winter, and spring would be expected to have a fish assemblage dominated by the Atlantic cod, an important species that is preponderant in most New England prehistoric coastal sites (Carlson 1986; 1988b).

DISCUSSION

The fish assemblage from Locus Q-6 of the Quidnet site is characterized by a dominance of bluefish (*Pomatomus saltatrix*) and spiny dogfish (*Squalus acanthias*). This suggests a warm season occupancy of the site, an interpretation of site seasonality that differs significantly from Little's (1983) current interpretation of a late fall, winter, and early spring occupation. The low incidence of cod (*Gadus morhus*) also suggests that the site was not occupied during the cold season because it is a species that can be fished in abundance during the cold seasons of the year, and therefore its virtual absence is significant. The accumulated faunal and site locational data for seasonality are thus contradictory and controversial, and may be interpreted in a variety of ways.

The issue of storage

One possibility is that the fish were caught in the warm season and preserved for winter use at Quidnet. For example, Little (1988a:79), in arguing for a winter occupation of sites on Nantucket, has suggested that, "the winter shell midden sites on the Cape and Islands we have been discussing may well be only winter sites, with bones of dried

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summer fish. The incomplete skeletal remains of fish in shell middens supports this proposal." This scenario is not favored by the author for a number of reasons.

First, operating under Zipf's (1949) principle of least effort, it could be argued that the abundance of codfish and other cold season species in the environment, such as the winter flounder and tomcod, all of which can be taken and eaten fresh, would have offered little incentive for spending a considerable amount of time and effort drying and preserving summer catches.

Second, there is currently substantial debate as to whether there is any good evidence that preservation and storage of faunal resources were significant subsistence-related practices on the Northeast Coast. The question revolves around the issues of ethnohistorical information and archaeological visibility. It has been argued that there is scanty ethnohistorical information from *primary* documents concerning Native American fish preservation, and certainly none that describe it as a major subsistence practice (Carlson 1986; Sanger and Sanger 1986). For example, Sanger and Sanger (1986) critiqued Barber's (1982) interpretation of extensive shellfish preservation at the Wheeler's site by stating that, "To date, there is no convincing evidence in any of the central Maine coastal shell middens for drying racks and no ethnographic evidence to support the practice." Black and Whitehead (1988) have countered by citing mostly *secondary* sources on faunal resource preservation, and by stating that it is a "questionable assumption that preservation and storage practices will leave easily discernible traces in the archaeological record, especially in the form of drying rack features" (1988:20).

In looking at the primary accounts only, from southern New England, this author argues that a single statement by Gookin in 1674 (1792:150) that dried fish were boiled in stews, and a brief note by Wood in 1635 (1865:101) that "basse" and lobsters were dried on scaffolds in the hot sunshine over smokey fires for winter use, does not constitute *significant* evidence of fish preservation and storage in southern New England. These accounts sound more like off-hand culinary descriptions than treatises on intensive preservation and storage technology. Indeed, this issue is one of perspective and scale. Certainly nowhere in the New England accounts is there evidence of the type or degree of classic preservation and storage technology of fish such as on the Northwest Coast - an observation reflected in Black and Whitehead's (1988:23) statement on the "apparent absence of large-scale preservation and storage on the Northeast coast."

A further issue that has not been discussed in previous publications on the problem of pre-contact fish preservation/storage is the probability that the historic documents are describing a post-contact practice. The descriptive primary documents post-date, by at least one hundred years, European contact and Native American exposure to the large-scale European "dry" preservation processing of the commercial cod fisheries (Innes 1940), in which Native Americans were involved (Harrington 1985). It now appears to be generally accepted that the practice of using fish as fertilizer by the Native Americans in New England was an adopted European practice (Ceci 1975); to be logically consistent with this hypothesis, the idea of pre-contact fish preservation and storage should also be challenged. In general, with arguments presented above, the unsupported use of ethnohistorical data on Native American subsistence practices to infer pre-contact patterns is a dubious undertaking.

In a recent publication on the Hoko River Fishing Camp on the Olympic Peninsula in Washington, Croes (1988) presents a simulation model of a pre-storage and post-storage economy based on naturally available faunal resources that was tested against a rigorously sampled and quantified archaeological faunal data base from the Hoko site. These are the directions that archaeologists are going to have to take in New England archaeology in order to present and test plausible hypotheses about subsistence practices. We need better sampled, analysed, and quantified faunal assemblages from sites throughout this region in order to test hypotheses about storage and preservation technology. The sampling, curation, and funded analysis of faunal remains by archaeologists from New England sites is not comparable to that in other areas of the country. Faunal remains, and particularly fish remains, can provide a wealth of information on past Native American lifeways, but are still given short shrift compared to other types of archaeological analyses in New England--a situation that has to be rectified if the discipline is to proceed in this region.

Third, Little's argument that incomplete skeletal remains of fish in shell middens supports the proposal that fish preservation was undertaken in New England (Little 1988a:79) is unclear. It is evident on the basis of extensive research on fish faunal collections throughout New England and the Northwest Coast, that skeletal remains of fish are always incomplete; in fact, skeletal remains of all classes of vertebrates are normally incomplete at archaeological sites, due to various taphonomic and sampling factors (see Binford and Bertram 1977; Shipman 1981). Therefore, it is not clear how this argument relates to preservation of summer species for winter use.

Finally, in the specific case of the Quidnet site, bluefish has been identified as the dominant catch. It was noted above how unpredictable the abundance and occurrence of this species has been in the past, and thus could not have been relied upon as a staple resource. The requirement of a predictable, abundant, and temporally restricted fish resource is considered crucial to the development of an intensive preservation technology for a specialized economy (Schalk 1977). Given the unreliability of bluefish abundance, it is unlikely to have been depended upon, or to have provided the impetus for a focus on fish preservation and storage for winter use. Therefore, the interpretation of site seasonality preferred by the author is that the fish remains found at Quidnet represent warm season catches that were eaten at the site as they were caught, supporting a warm season occupation of the site.

Other issues

If all interpretations of warm and cold season occupancy are accepted for Quidnet, based on the total faunal and site-locational evidence, then that suggests the possibility of year-round occupation for the site. However, the paucity of Atlantic cod remains at the site brings into question Little's interpretation of cold season occupation since cod remains would be expected in abundance if the site had been occupied outside of summer, particularly since there are rich cod fishing banks off the east coast of Nantucket (Figure 3). This is corroborated by Bragdon's (1986) historical data on the Native American fishing economy on Nantucket as discussed above. Thus, the proposed association between site setting in protected locations and cold season occupancy requires reconsideration. In fact, it seems reasonable to argue that regardless of season of the year, prehistoric inhabitants would usually seek site locations that offered shelter from the strong winds typical of Nantucket Island.

Furthermore, the lack of water in modern summers in the pond adjacent to the Quidnet site is possibly not a good indicator of seasonality given that past water levels may have been significantly different from those of today, a fact alluded to by Little (1983:7):

> "there is a very slight suggestion in the artifact spatial distribution that later occupations tended to be closer to the present pond edge than did earlier

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occupations. Therefore, in reconstructing the environmental history of this pond, one should look for evidence that in the past a) it was seasonal, and b) it had a higher water table than at present."

Finally, the interpretation that the presence of gray seal (*Halichoerus grypus*) in the faunal assemblage from Quidnet represents a winter and early spring occupation of the site should be reconsidered. This interpretation is based on the idea that the gray seal would have been most accessible during the winter and early spring when they hauled out onto the beaches for pupping and moulting (Little 1983:7). On the basis of this argument, the potential for gray seal being a cold season indicator is relatively high until it is realized that the faunal remains at Quidnet consist of only two teeth. Given the other evidence for summer occupation, it seems reasonable to speculate upon possible processes of curation of the seal teeth. Teeth were often reserved as portable artifacts of adornment or ceremony, which would then negate their usefulness as seasonality indicators. It would have been a different situation entirely if butchered post-cranial elements of seal had been found, a possibility that cannot be fully evaluated until the mammal remains are more rigorously identified (Elizabeth Little, personal communication 1988).

In conclusion, the identification and analysis of the fish remains from Locus Q-6 at the Quidnet site, Nantucket, has demonstrated a marine orientation to subsistence practices, including the probable use of watercraft in fishing pursuit - a pattern that should not be unexpected for the extreme coastal environmental setting of Nantucket Island. A new seasonal interpretation is offered for the site, one of warm season occupancy, which differs from previous seasonality interpretations based on other types of data. The few fish remains that have been identified from other sites on Nantucket, such as the Atlantic sturgeon, sea robin, sand shark and spiny dogfish suggest that other sites on the Island were also occupied during the warmer months of the year. Possibly we should be viewing Nantucket as having been an inviting summer retreat from the mainland during prehistoric times, just as it is today.

ACKNOWLEDGEMENTS

I would like to acknowledge Elizabeth Little for providing me with the opportunity to undertake this analysis, for supplying me with data on bluefish "comings and goings" at Nantucket, and additional useful references, for assisting in modern fish specimen collection, for enjoyable and stimulating debates over the telephone, and for challenging me to write this article in the first place. I also thank J. Clinton Andrews for his compilation of dates of the annual arrival of bluefish at Nantucket, and for collecting three new species of fish for my comparative collection. Karsten Hartel assisted in my use of the comparative fish collection at the Museum of Comparative Zoology, Harvard University, and Dena Dincauze of the University of Massachusetts at Amherst provided useful critical comments. All errors in fact or interpretation are solely my own.

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RADIOCARBON AGES (SEE BMAS 49:1)

Butler Site, Osterville, MAS #M46-E25; MHC #19-BN-511

Sample: wood charcoal, Feature 25, Rank 15, sample 1. Found in square E1FN below a clay-like "floor" and above another clay-like "floor", in a pit containing potsherds, bone and charcoal. Apparent sample age: 855 $\pm$ 135 B.P. (GX-10228) in radiocarbon years before 1950 $\pm$ 1 sigma. Error is judged by the analytical data alone. No ^{13}C correction; ^{14}C half-life: 5570 years; 95% NBS Oxalic Acid Standard. (Marie Eteson, Cape Cod Chapter, Geochron Report 1984; MAS Matching Funds Application, 1984).

Plymouth Street Site, Bridgewater, MHC #19-PL-540

Sample: charcoal associated with small quartz triangles. Sample age: 1740 $\pm$ 60 (Beta-28589) in radiocarbon years before 1950 $\pm$ one sigma. No ^{13}C correction. Errors of modern standard, background and sample. ^{14}C Half-life: 5568 years; 95% NBS Oxalic Acid Standard. (Curtiss Hoffman, North River Chapter Chapter, MAS Matching Funds Application 1988; Beta Analytic Report 1988).

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THE BEAVER POND ARCHAEOLOGICAL STUDY

Alan E. Strauss

INTRODUCTION

This study presents the analysis of two major artifact collections from the town of Franklin, Massachusetts (Fig. 1). The Joseph and John Caterina collections were examined as part of the background research for a Phase I Archaeological Investigation of the Shepards Brook Interceptor in Franklin (Strauss and Elia 1985).

The first collections analysis conducted in the vicinity of Beaver Pond was done in 1968 by Dr. Dena Dincauze as part of the Charles River Basin study (Dincause 1968). Dincauze met with local collectors, Ralph Hoar and Albert Levasseur, and analyzed their collections from the Beaver Pond area. Three prehistoric sites (M-34, 23; M-34, 24D; and M-34, 25D) were recorded and were estimated to have been in use from about 3,000 to 1,000 B.C. These three sites contained the only provenienced artifacts in Franklin at the time.

During background research conducted for the Shepards Brook Interceptor, the author examined a collection of artifacts housed at the Franklin Historical Society's Horace Mann Museum. The artifacts in the collection were originally organized by Mr. Linwood A. Beverly Jr., a Massachusetts Archaeological Society member, who wanted to establish a permanent display of prehistoric remains from the Franklin area. Many local collectors wanted to include their artifacts in the display and some donated their entire collections. It is these artifacts that Dr. Dincauze examined in the late 1960s. Some of the artifacts on display at the museum were donated by the Caterina brothers; however, because there was no guarantee that the artifacts would be safe from vandalism or theft, the Caterinas retained most of their artifacts. Their collection, perhaps the largest and best provenienced, has consequently gone uncatalogued and unrecorded until this report.

The Caterinas have lived in Franklin for about 49 years and have collected artifacts from various localities, especially around Beaver Pond. Anthony Caterina recovered a

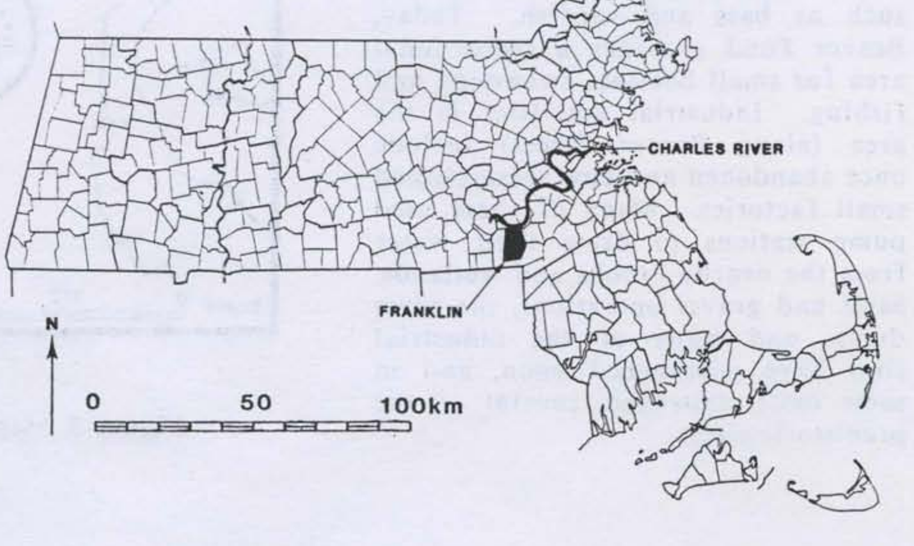

Figure 1. Map of Massachusetts showing Town of Franklin and the Charles River.

prehistoric "whetstone" which he brought to the Bronson Museum and which was recorded and detailed by William Fowler in the *Bulletin of the Massachusetts Archaeological Society* (Fowler 1975:29).

ENVIRONMENTAL BACKGROUND

Beaver Pond is a man-made pond which was created by the damming of one of the tributaries of Mine Brook (Fig. 2). The pond is surrounded by a wetland area containing grasses, sedges, cattails, phragmites, and alders. Mine Brook, a tributary of the Charles River, meanders through the marshland which is flanked by low plateaus and small ridges and knolls (Fig. 3). The ridges and knolls, composed of well-drained stratified sands and gravel, were formed during the last glacial period, some 12,000 years ago. The extensive marsh surrounding Beaver Pond, part of a "wetland valley" that runs north-south paralleling the Charles River, is likely the remnant of an ancient glacial lake.

Figure 2. Beaver Pond, looking NE.

Sections of Mine Brook flow freely even in mid-winter and the ponds and marshes provide a habitat for a variety of aquatic and semi-aquatic wildlife. Besides migratory waterfowl, Mine Brook once supported cold-water fish species. Recent pollution from textiles and plastics factories has limited the waters to exclusively warm-water fish such as bass and sunfish. Today, Beaver Pond provides a recreational area for small boating, swimming and fishing. Industrial activities in the area (along Beaver Street) include once abandoned and now reestablished small factories. Many of these used pump stations to draw their water from the nearby brooks and wetlands. Sand and gravel operations, the town dump, and many of the industrial sites have encroached upon, and in some cases destroyed, several of the prehistoric sites.

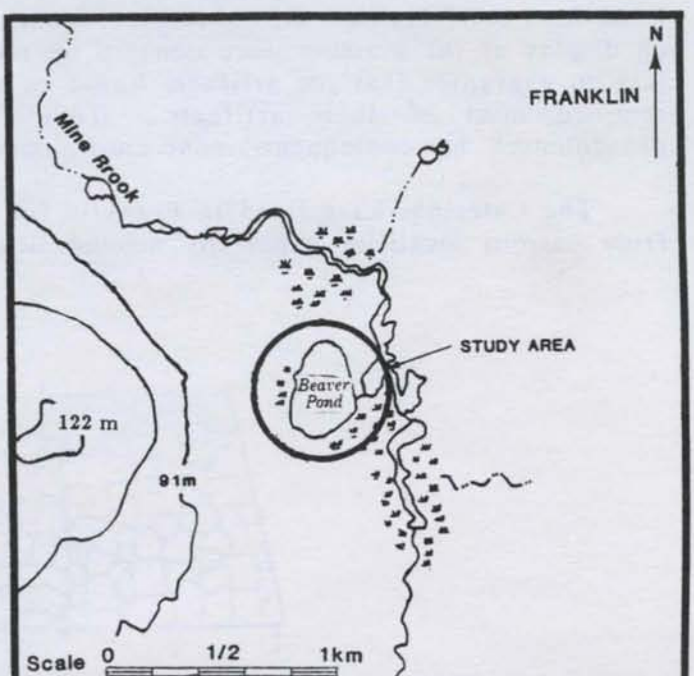

Figure 3. Map of Beaver Pond area.

COLLECTIONS ANALYSIS

A total of 661 artifacts was examined as part of the Beaver Pond Archaeological study. Three groups of tools were recognized in the Caterina collection: 1) projectile points, constituting 79% of the total; 2) other chipped stone tools (knives, scrapers, bifaces, perforators, etc.), making up 15% of the total; and 3) ground, pecked, or polished tools, accounting for 6% of the collection.

The Caterina collection can be divided into seven major collecting locales based upon topographic features and the distribution and types of artifacts found. Each locale was considered to be an individual site, although some of these sites may overlap in terms of prehistoric land use and settlement patterns. The boundaries for each site, largely derived through the Caterina's efforts, were based upon horizontal artifact distributions and changes in the topography.

Although numerous single points or small clusters of chipping debris were found, these are not recorded within this brief report. Table 1 presents the number and percentages of artifacts from each site of the total collection.

TABLE 1. The Number of Artifacts and Percentages of the Total Collection By Site.

Site	Number	Percentage of Total
American Felt Site	268	40
Knoll Dump Site	157	24
Chelsea Drum Site	96	15
Beaver Street Knoll Site	73	11
Caterina Site	32	5
Beaver Flats	26	4
Beaver Pond South Knoll	9	1

Artifacts were classified using the procedures outlined by the Massachusetts Historical Commission's Guide to Prehistoric Site Files and Artifact Classification System (Johnson and Mahlstedt 1984). Broken projectile points and unclassified points were recorded as untyped unless a substantial diagnostic portion was present.

The Caterina collection documents the presence of prehistoric peoples around Beaver Pond from at least as early as the Early Archaic period (ca. 9,000 - 8,000 BP). Two bifurcate base points in the collection make up less than one percent of the 508 total diagnostic projectile points (Fig. 4-A, B).

Middle Archaic (ca. 8,000 - 6,000 BP) cultural materials are well represented by 56 points (11%), constituting the second largest portion of the diagnostic points. Neville-Like, Neville Variant, and Stark points were recovered from six of the seven collecting locales (Fig. 4-C, D). These points were most often manufactured from tan quartzite, gray-green argillite, or New England volcanics.

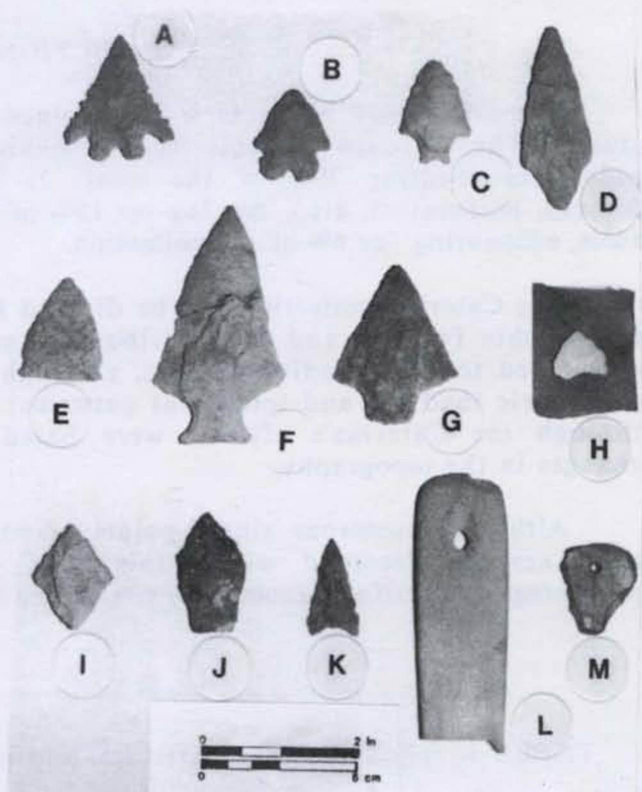

Figure 4. Bifurcate Base points (A-B); Neville-Like (C); Stark (D); Archaic-Notched (E); Susquehanna Broad (F); Atlantic-Like (G); Small Triangle (H); Rossville (I); Large Pentagonal (J); Madison (K); Whetstone (L); Pendant (M).

The Late Archaic period (ca. 6,000 - 3,000 BP) contributes 77% of the total diagnostic points, the largest sample. A total of 390 Late Archaic points was recorded in the Caterina collection. All three major traditions commonly defined as part of the Late Archaic period are represented. Quartz Small Triangles (Squibnocket) (Fig. 4-H) and Small Stemmed points (I-IV) dominate the collection quantitatively. These firmly establish the presence of the Small Stemmed Tradition. The Laurentian Tradition is represented by numerous tan quartzite Archaic Notched and Broad Eared points (Fig. 4-E). The Susquehanna Tradition is documented by the presence of numerous Susquehanna Broad-Like points often made of tan quartzite, argillite, or New England volcanics (Fig. 4-F). Atlantic points are also represented and are usually made from New England volcanics or argillite (Fig. 4-G).

Other Late Archaic diagnostics include Wayland-Notched and Genessee types, accounting for a very small portion of the collection. The end of the Archaic period and its transition into Woodland times is represented by two percent (12) of the diagnostic points. Fishtail points, quartz Small Pentagonal points, and steatite bowl fragments all believed to represent this period exist in the collection.

The Early Woodland period (ca. 3,000 - 1,600 BP) is documented by the presence of Meadowood, Rossville and Adena-Like points. These point types appear to be usually made of New York State cherts and New England volcanics. Nine points (2%) were recovered from this time period.

Woodland Stemmed, Woodland Corner Notched, Woodland Lanceolate, and Large Pentagonals (Fig. 4-J) document the presence of the Middle Woodland period around Beaver Pond. These point styles are almost always manufactured from argillite, chert, or New England volcanics. A total of 18 points (4% of the entire collection) was recorded.

The Late Woodland period (ca. 1,300 - 400 BP) is documented by 21 points accounting for four percent of the total diagnostics. Large Triangles (Levanna) made of quartz or volcanics and Madison-Like points are recorded as time markers for this period (Fig. 4-K).

No materials that can be assigned to the Contact Period were recognized within the artifacts collected around Beaver Pond.

The artifact frequencies for each time period are provided in Table 2. Late Archaic materials dominate the collection, followed by Middle Archaic diagnostics. All other time periods are only slightly represented.

TABLE 2. NUMBER AND PERCENTAGES OF DIAGNOSTICS BY TIME PERIOD FOR SEVEN BEAVER POND SITES.

	SITES								
TIME PERIOD	KNOLL DUMP	BEAVER FLATS	BEAVER ST. KNOLL	CHELSEA DRUM	AMERICAN FELT	CATERINA	BEAVER POND SOUTH	TOTAL	PERCENT
Early Archaic	1	0	0	0	0	1	0	2	<1%
Middle Archaic	11	1	4	6	33	0	1	56	11%
Late Archaic	100	12	49	59	152	14	4	390	77%
Archaic/ Woodland	5	0	2	1	3	0	1	12	2%
Early Woodland	2	1	2	1	2	0	1	9	2%
Middle Woodland	2	1	3	5	5	0	2	18	4%
Late Woodland	1	0	3	6	11	0	0	21	4%
TOTAL	122	15	63	78	206	15	9	508	

RAW MATERIALS

Time did not permit a complete analysis of the raw materials used to make each and every artifact in the collection. In general, quartz probably comprises the majority of raw materials used. Tan, gray, and white quartzite are also well represented. Metamorphosed mud and siltstones such as argillites, which weather gray, green, tan, or buff, appear to be favored during the Middle Archaic and Middle Woodland periods. Argillites are common in the Caterina collection. The next most common material is that of New England volcanics. This term is used to represent all locally available volcanics, including Attleboro red felsite, Marblehead-Newbury volcanics, porphyritic and aporphyritic felsites, banded flowstones, and Braintree-like hornfels. No felsites similar to the Mt. Kineo materials were recognized in the collection. A few pieces of mylonite were identified in the chipping debris. Cherts are relatively uncommon in the collection. The few examples recorded are black to brown in color and patinated. The pieces examined are similar to those often found in the Connecticut Valley, probably having their source in eastern New York State. A few pieces of jasper-like material were documented in the collection. These fine-grained materials range in color from mustard to red-brown and are similar to what is often classified as Pennsylvania jasper (Luedtke 1987).

SITE REPORTS

Individual site reports are provided for seven of the major sites found by the Caterina brothers. The details on the exact location of each site are recorded in the prehistoric site files at the Massachusetts Historical Commission in Boston.

The Knoll Dump Site

The Knoll Dump site is located on a knoll north of Beaver Street. The western portion of the site was destroyed during the construction of the highway (Ralph Hoar, personal communication 1985). The Caterinas dug excavation pits at this site where they found the majority of artifacts concentrated at the junction of the A- and B-soil horizons. An Attleboro red felsite Bifurcate Base point was found well into the subsoil. Several pecked, polished, and ground heavy woodworking tools were also recovered. A total of 122 diagnostic projectile points was recovered. An inventory of the artifacts from the Knoll Dump Site is presented below. Much of this site has been excavated, although some portions may remain intact and should be preserved for future research.

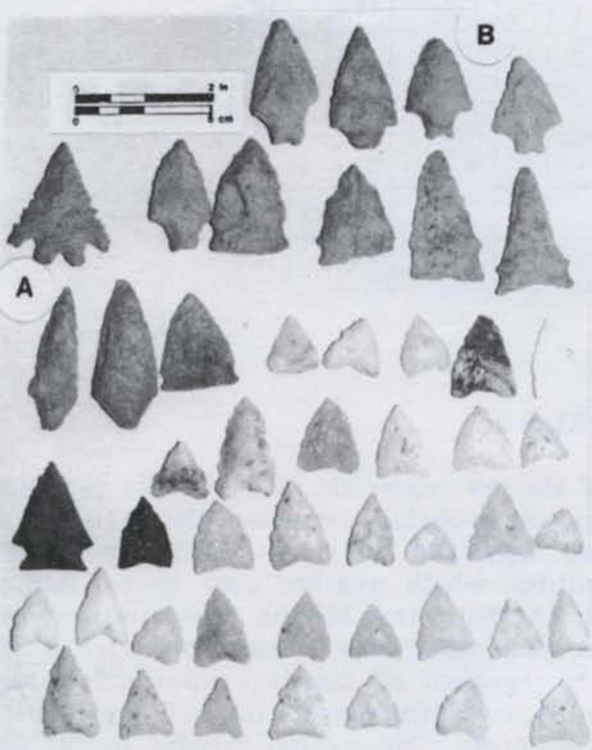

Figure 5. Various artifacts from the Knoll Dump Site. Bifurcate Base point (A); Neville-Like (B).

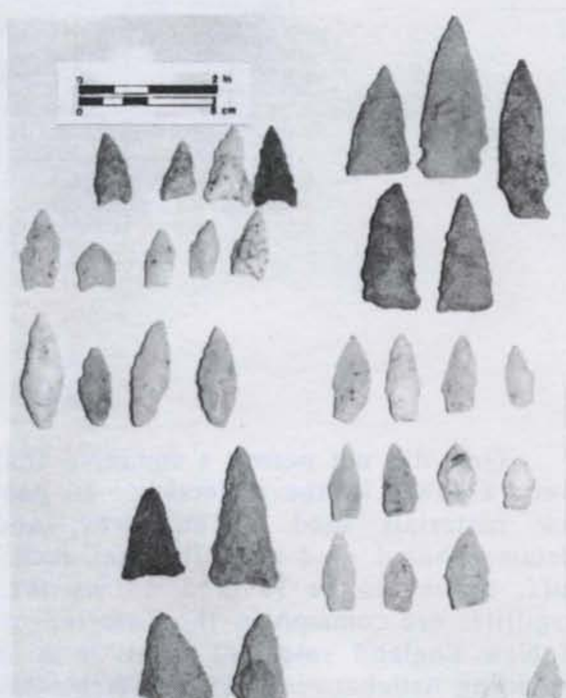

Figure 6. Various artifacts from the Knoll Dump Site.

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Knoll Dump Site Inventory

	Joseph Caterina	John Caterina
Points		
Bifurcate Base	1	-
Neville-Like	8	1
Stark-Like	2	-
Archaic Notched	8	5
Broad Eared	1	1
Small Stemmed I	11	-
Small Stemmed II	3	-
Small Stemmed III	10	-
Small Stemmed IV	3	-
Small Pentagonal	5	-
Small Triangle	42	13
Susquehanna Broad-Like	2	-
Fishtail	1	-
Meadowood	2	-
Woodland Lanceolate	2	-
Madison-Like	-	1
Total	101	21
Chipped Stone Tools		
Core, bifacial, quartz	-	6
Core, rough, quartz	-	3
Core, bifacial, basaltic	1	-
Bifacial Implement Blades	-	11
Perforator, expanded base, quartz	-	1
Edge Tool, steep-end scraper, quartz	-	1
Edge Tool, backed knife, quartz	-	1
Bifacially chipped heavy stone tool blank	1	-
Total	2	23
Ground/Pecked/Polished Tools		
Gouge, full-channel	1	2
Axe	2	-
Adze	1	-
Drilled Stone	1	1
Carved Stones	1	-
Notched Stone, both sides	-	1
Total	6	4

The majority of the artifacts from the Knoll Dump Site belong to the Late Archaic period (ca. 5,000-3,000 BP). All periods from the Early Archaic (Fig. 5-A) to the Late Woodland are represented. The large amount of quartz Small Triangles (Fig. 5), Small Stemmed points (Fig. 6) and high density of quartz chipping debris suggests that this site was at one time a major activity area for the manufacture of quartz projectile points during the Late Archaic period. Middle Archaic (8,000-5,000 BP) point styles are also well represented in the collection (Fig. 5-B), but all other periods are represented by only a single or a few diagnostics.

The Beaver Flats Site

The Beaver Flats Site is located on a low-lying nearly level terrace. The site once extended further north prior to the construction of Beaver Street. The site location is interesting in that it is not located on one of the many surrounding knolls or ridges in the area, but rather in a low spot adjacent to the pond.

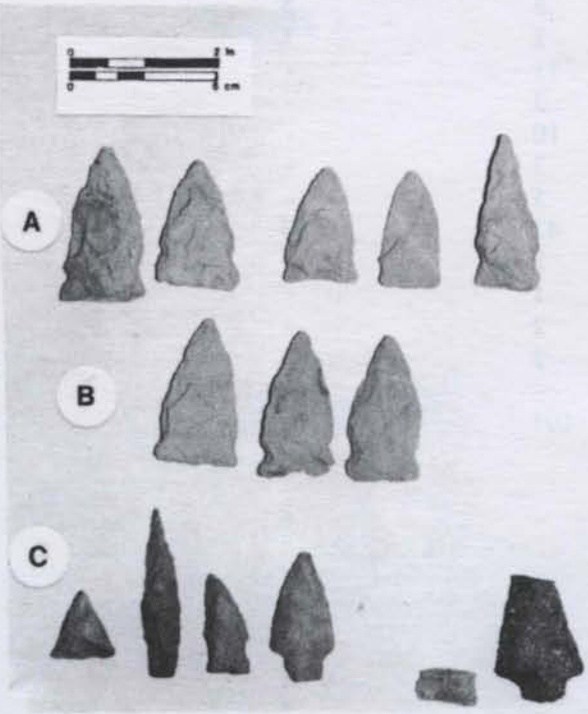

Figure 7. Beaver Flats Artifacts. (A-B) Cache of Green Argillite points; (C) Various points.

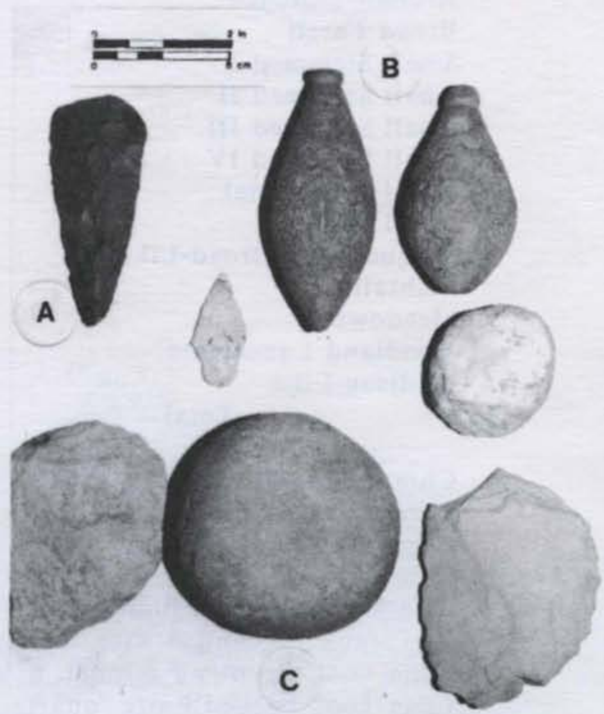

Figure 8. Beaver Flats Artifacts. (A) Chert Meadowood Blade; (B) Plummets; (C) Hammerstone.

Large quantities of quartz, quartzite, and volcanic chipping debris were found at this locale. A concentration of charcoal, calcined bone, and flakes was found in association with an Atlantic-Like point (ca. 4,100-3,600 BP). Furthermore, a cache of eight green-gray argillite Archaic Notched points (Fig. 7-A, B), a chert Meadowood point (Fig. 8-A), two plummets (Fig. 8-B), and a hammerstone (Fig. 8-C) were also recovered from this site. A total of 15 diagnostic artifacts was recorded. The artifactual remains were concentrated at the A/B-soil horizon interface. An inventory of the artifacts from the Beaver Flats Site is provided below.

Beaver Flats Site Inventory

	Joseph Caterina	John Caterina
Points		
Neville-Like	1	-
Archaic Notched	8	-
Small Stemmed III	1	-
Small Triangle	1	-
Atlantic-Like	1	-
Wayland Notched-Like	1	1
Meadowood Blade	-	1

(Beaver Flats Inventory cont'd)	(Joseph Caterina)	(John Caterina)
Woodland Lanceolate	1	-
Total	14	1
Chipped Stone Tools		
Core, bifacial, volcanic	-	2
Edge Tool, unifacial, quartzite	-	1
Bifacial Implement Blade	-	1
Untyped chipped stone blank	-	1
Total	0	5
Ground/Pecked/Polished Tools		
Hammerstone	-	2
Plummets	-	2
Perforated Stone	-	1
Chert nodule, poor grade	-	1
Total	0	6

Beaver Street Knoll Site

The Beaver Street Knoll Site is located near Beaver Pond. The northern portion of this site was destroyed during the construction of Beaver Street. The Caterinas conducted extensive excavations on the top and lower sides of the knoll leaving a very small portion of the area undisturbed. Small, isolated spots still may remain intact and provide data on stratigraphy, depositional processes, and integrity.

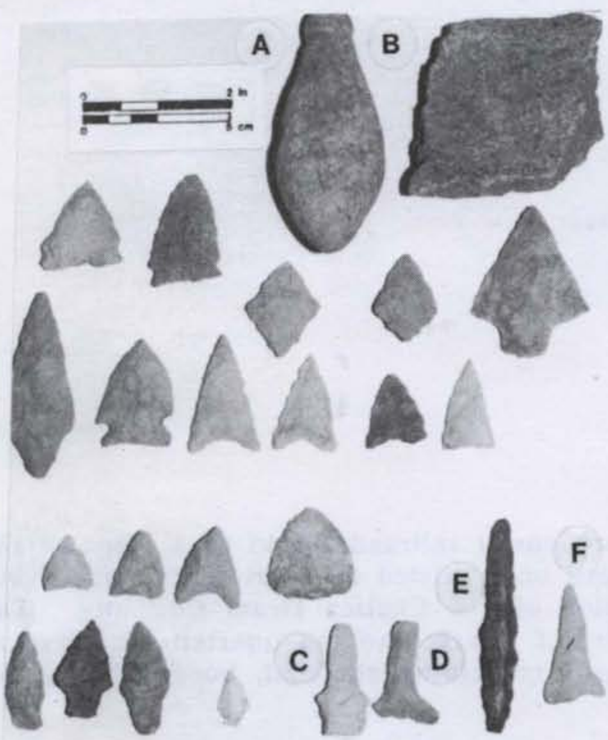

Figure 9. Various Artifacts from Beaver Street Knoll. (A) Plummet; (B) Steatite Rim Fragment; (C-F) Perforators.

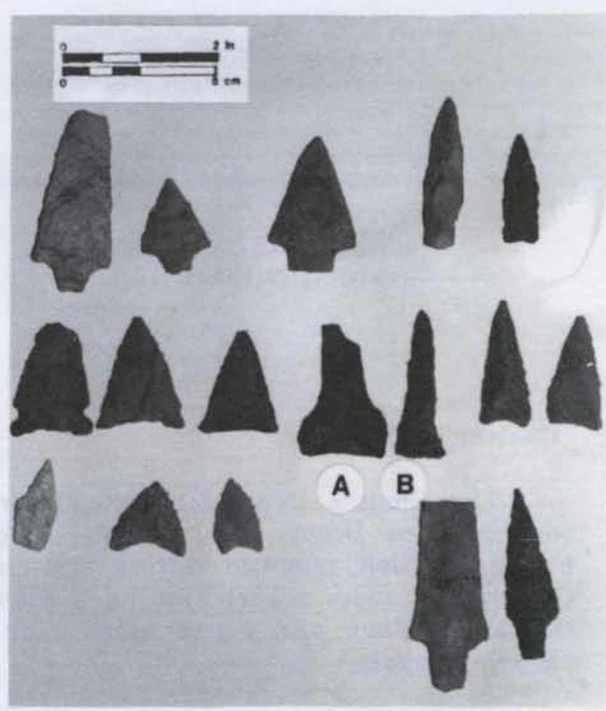

Figure 10. Various Artifacts from Beaver Street Knoll. (A-B) Perforators.

Seven chipped stone tools were recorded, of which six are perforators (Fig. 9-C, D, E, and F; Fig. 10-A, B). Included in the primarily Late Archaic assemblage are, a plummet (Fig. 9-A), a channel gouge, and a steatite rim sherd (Fig. 9-B). Sixty-three diagnostic artifacts were catalogued from the Beaver Street Knoll site (see inventory).

Beaver Street Knoll Site Inventory

	Joseph Caterina	John Caterina
Points		
Neville-Like	-	3
Stark-Like	-	-
Archaic Notched	5	-
Archaic Stemmed	-	2
Small Stemmed (I-IV)	-	13
Small Stemmed II	2	2
Small Stemmed III	1	2
Broad Eared	1	1
Eared Triangle	-	2
Small Triangle	3	13
Small Pentagonal	-	2
Atlantic-Like	1	1
Rossville-Like	2	-
Woodland Corner Notched	1	-
Woodland Lanceolate	-	2
Madison-Like	1	2
Total	18	45
Chipped Stone Artifacts		
Perforator, crescent base	1	-
Perforator, straight base	1	-
Perforator, expanded base	1	2
Perforator, simple	1	-
Bifacial Implement Blade	1	-
Total	5	2
Ground/Pecked/Polished Stone Artifacts		
Plummet	1	-
Gouge, full-channel	-	1
Steatite rim sherd	1	-
Total	2	1

Chelsea Drum Site

The Chelsea Drum Site extends from the Conrail railroad tracks to a ridge at the edge of Mine Brook. A knoll and level plateau once existed adjacent to the tracks but has since been removed during the construction of the Chelsea Drum Company. The Caterina brothers report finding a high density of quartz and tan quartzite debitage at this site. They also found stone-lined fire pits containing charcoal, burned bone, and chipping debris.

The Chelsea Drum Site is the third largest component of the Caterina collection, contributing 15% of the total artifacts (Figs. 11, 12, 13, and 14). A total of 80 projectile points was recorded, 78 of which were diagnostic. Sixteen chipped stone tools, including

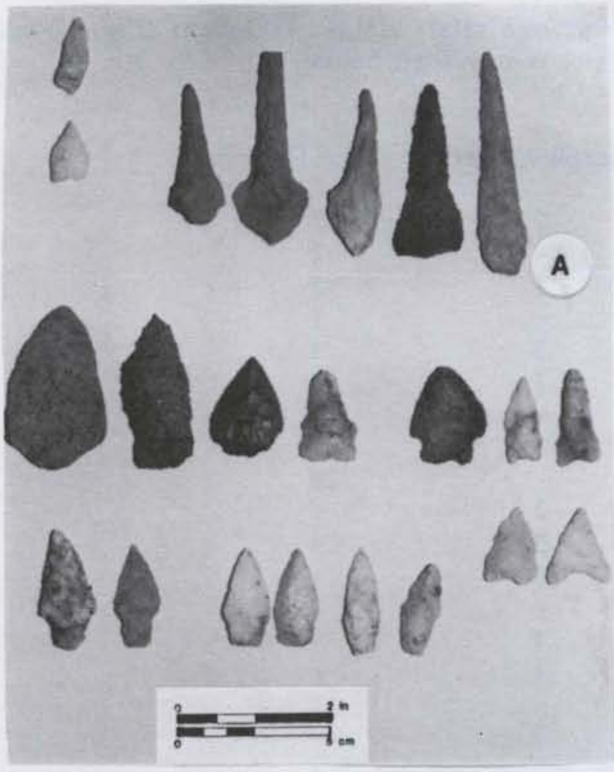

Figure 11. Artifacts from Chelsea Drum Site. (A) Five Perforators.

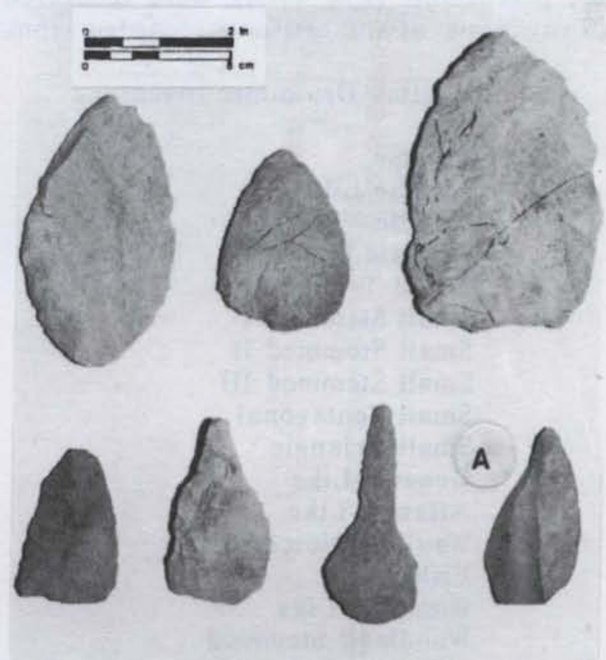

Figure 12. Bifacial Artifacts from Chelsea Drum Site. (A) Atlatl Weight Fragment.

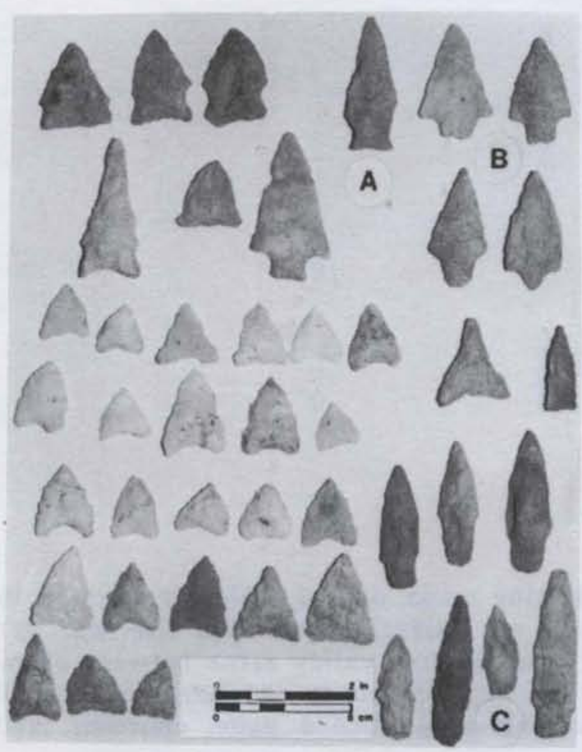

Figure 13. Chelsea Drum Site Artifacts. (A) Fishtail Point; (B) Neville-Like; (C) Narrow-Stemmed Points.

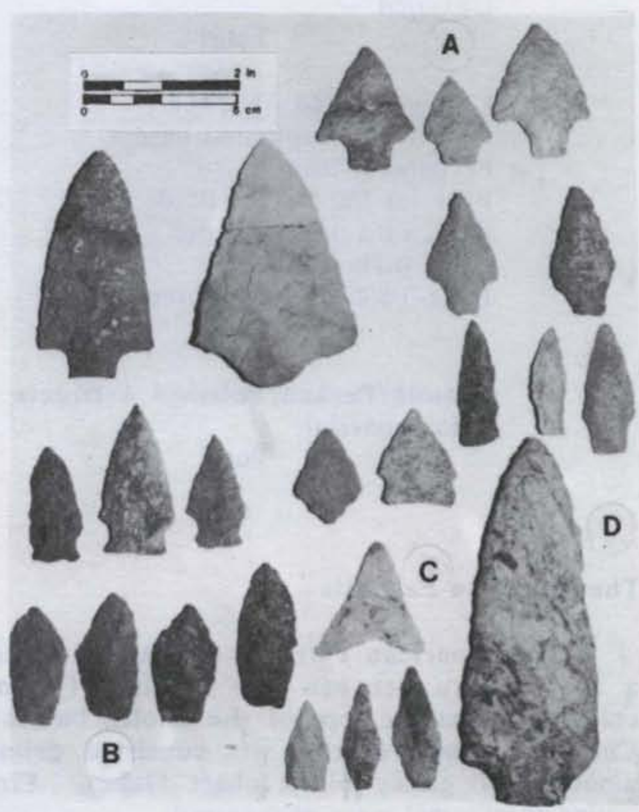

Figure 14. Chelsea Drum Site Artifacts. (A) Atlantic-Like; (B) Large Pentagonals; (C) Levanna; (D) Genesee-Like.

five perforators (Fig. 11-A), were recovered as was one atlatl weight fragment (Fig. 12-A). An inventory of the artifacts recorded from this site is provided below.

Chelsea Drum Site Inventory

	Joseph Caterina	John Caterina
Points		
Neville-Like	2	2
Neville Variant	-	2
Archaic Notched	1	3
Eared Triangle	-	1
Small Stemmed I	3	4
Small Stemmed II	3	8
Small Stemmed III	-	1
Small Pentagonal	-	1
Small Triangle	-	26
Genesee-Like	2	-
Atlantic-Like	3	-
Wayland Notched-Like	3	-
Fishtail	-	1
Rossville-Like	1	-
Woodland Stemmed	1	-
Woodland Lanceolate	-	1
Large Pentagonal	3	-
Large Triangle	3	1
Madison-Like	-	2
Untyped	-	2
Total	25	55
Chipped Stone Artifacts		
Perforator, expanded base	1	3
Perforator, simple	-	1
Bifacial Implement Blade	3	3
Core, bifacial, volcanic	2	1
Core, bifacial, quartz	-	1
Edge Tool, backed crescent, knife	-	1
Total	6	10
Ground/Pecked/Polished Artifacts		
Atlatl, partial	1	-
Total	1	0

The American Felt Site

The American Felt site consists of three collecting areas, one of which is situated in a low plateau between two knolls. The majority of artifacts from this site was not collected from the tops of the knolls, but rather from the low valley areas between them. Chipping debris at this site consisted primarily of large amounts of quartz and small amounts of glassy black chert flakes. Firepits containing burned bone, charcoal, and "stone platforms" were also found.

The American Felt Site contributes 41% of the total artifact collection. A total of 206 diagnostic projectile points was recorded (see inventory).

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American Felt Site Inventory

	Joseph Caterina	John Caterina
Points		
Neville-Like	17	3
Neville Variant	6	-
Stark-Like	6	1
Archaic Notched	9	1
Broad Eared	6	-
Eared Triangle	7	-
Archaic Stemmed	4	3
Small Stemmed I	7	3
Small Stemmed II	3	3
Small Stemmed III	4	2
Small Stemmed IV	1	1
Small Pentagonal	1	2
Small Triangle	39	8
Genesee-Like	3	-
Atlantic-Like	15	3
Susquehanna Broad-Like	20	2
Wayland Notched-Like	2	1
Fishtail	3	2
Rossville-Like	1	1
Woodland Stemmed	-	1
Woodland Lanceolate	4	-
Large Triangles	10	-
Madison-Like	-	1
Untyped	8	-
Total	176	38
Chipped Stone Artifacts		
Bifacial Implement Blade	25	2
Meadowood Blade	1	-
Core, bifacial, quartzite	2	-
Core, bifacial, volcanic	1	-
Edge Tool, steep-end scraper	1	5
Axe	1	-
Total	31	7
Ground/Pecked/Polished Artifacts		
Gouge, channel	1	-
Gouge, channel, bit	1	-
Gouge, channel, butt	1	-
Gouge, channel, section	2	-
Gouge, partial channel	1	-
Adze, bit	2	-
Untyped butt sections	4	-
Pestle	1	-
Atlatl, oval, partial	1	-
Atlatl, partial	1	-
Plummet, rough	-	1
Total	15	1
Pottery		
Undecorated sherds, body	-	6

(American Felt Inventory, cont'd)	(Joseph Caterina)	(John Caterina)
Decorated, cord wrapped stick impressed	-	1
Decorated, cord impressed	-	1
Total	0	8

Late Archaic period artifacts totaling 152 points dominate this site. Middle Archaic points were recorded at 33, making up the second largest time component. The Late Woodland period (ca. 1,300-400 BP) is represented by eleven diagnostic points, the largest number from this time period of any of the sites reported in the Caterina collection. The greatest number of point types are Small Triangles (47); Neville-Like (26) (Fig. 15-A); Susquehanna Broad-Like (22) (Figs. 16 and 17); and Atlantic-Like (18).

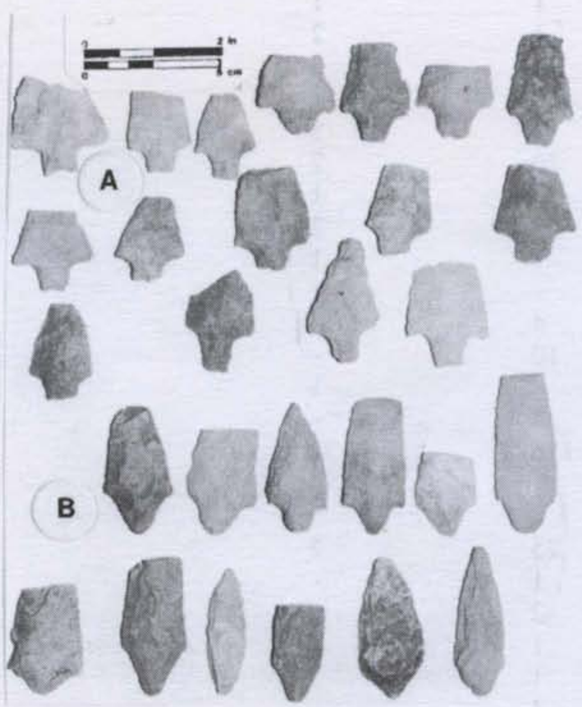

Figure 15. American Felt Site. (A) Neville-Like Points; (B) Stark-Like Points.

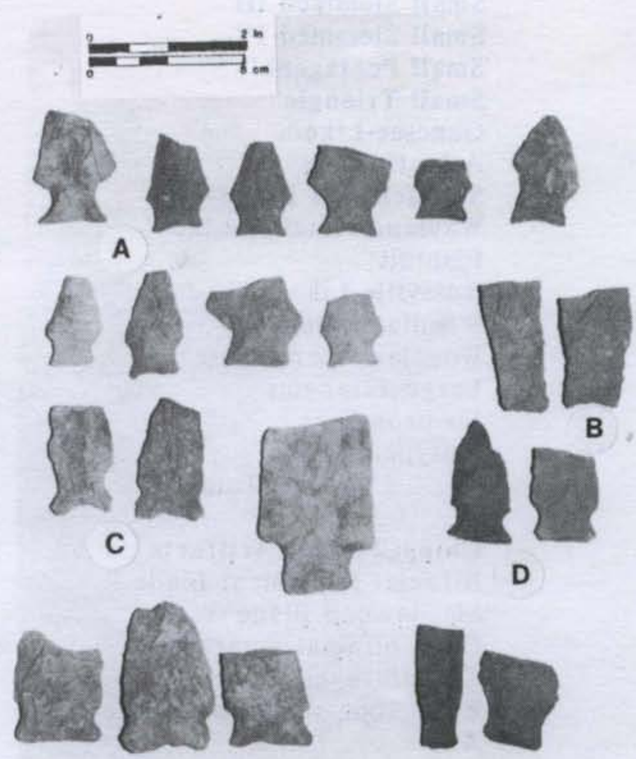

Figure 16. American Felt Site. (A) Susquehanna Points; (B) Woodland Lanceolate Points; (C) Otter Creek Points; (D) Wayland Notched.

This site may represent a major occupation area for the Susquehanna and Atlantic Traditions of the Late Archaic period. The site was also utilized during Woodland times, perhaps as a fishing or waterfowl hunting station. A steep end scraper in the collection suggests procurement activities, and gouges and adzes may be indicative of woodworking activities which might also be connected with fishing or waterfowl hunting pursuits (Fig. 18).

This site may hold valuable data on both plant and animal resource utilization during prehistoric times and thus may have important research potential if there remain undisturbed portions.

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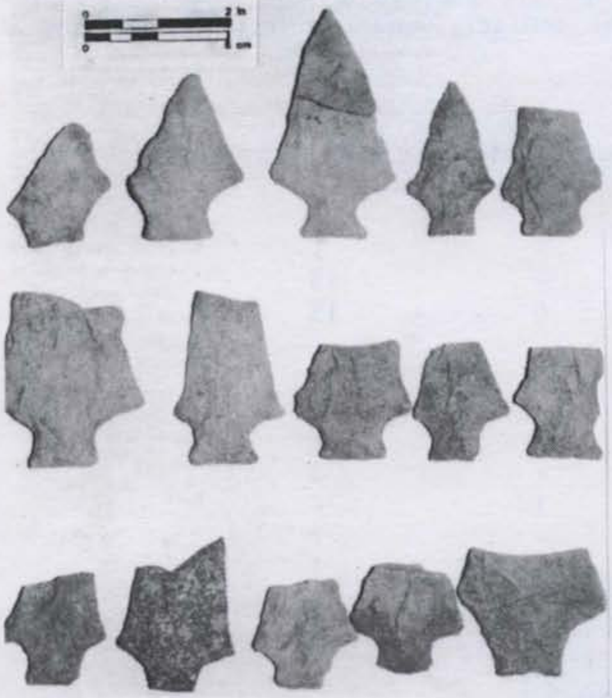

Figure 17. Various Susquehanna Broad points from the American Felt site.

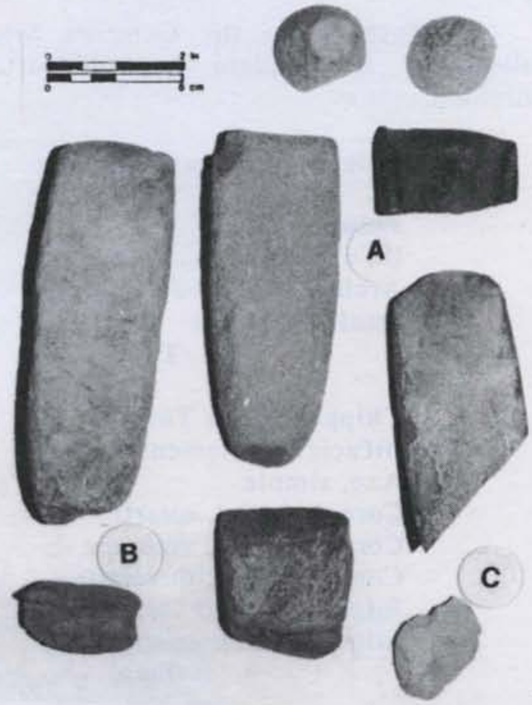

Figure 18. American Felt Site. (A) Woodworking Tools; (B) Atlatl Weight Fragments; (C) Incised Atlatl Weight Fragments.

Caterina Site

The Caterina Site is located on the northeast side of Beaver Pond. The western portion of the site formerly rose to a high sandy knoll before it was removed by sand and gravelling activities. The remaining portions of the site area support stands of eastern white pine (Pinus strobus). As was the case with other sites recorded by the Caterinas, collecting was done in the low area surrounding the knoll. The Caterinas excavated through two to three feet of gravel until they found prehistoric artifacts. Except for a hornfels bifurcate base point (Fig. 19-A), this site was dominated by Late Archaic Small Triangles. Scrapers, gravers, a pestle, a plummet (Fig. 19-B) and an ulu (Fig. 19-C), suggest that activities besides hunting took place at the site. An andesite full-grooved axe (Fig. 19-D) and a possible portion of an atlatl weight were also found. The atlatl weight was made of a black siltstone and exhibited thin striations which had been incised into one side. Quartz and porphyritic volcanic chipping debris was also recovered in moderate quantities.

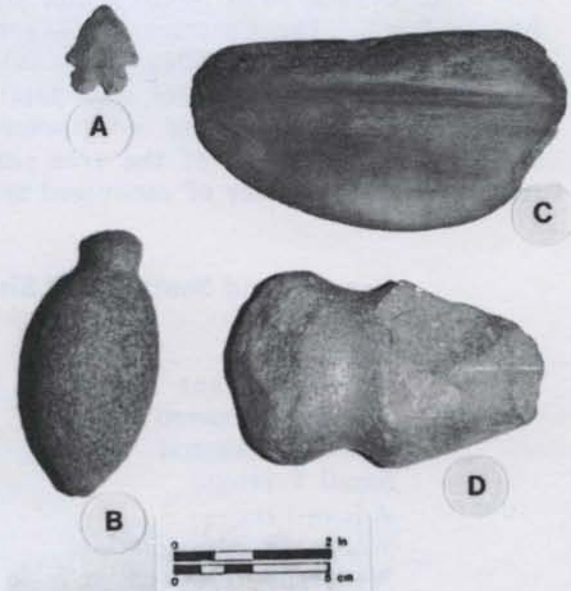

Figure 19. Caterina Site. (A) Bifurcate Base point; (B) Plummet; (C) Ulu; (D) Full-Grooved Axe.

Artifacts from the Caterina Site make up five percent of the total inventoried collection. A complete inventory of all of the artifacts found at the Caterina Site is provided below.

Caterina Site Inventory

	Joseph Caterina	John Caterina
Points		
Bifurcate Base	-	1
Archaic Notched	-	1
Small Triangles	-	13
Total	0	15
Chipped Stone Tools		
Bifacial Implement Blade	-	1
Axe, simple	3	-
Core, bifacial, quartz	-	3
Core, bifacial, volcanic	1	-
Core, bifacial, quartzite	-	1
Edge Tool, end scraper	-	1
Edge Tool, scraper/graver	-	1
Total	4	7
Pecked/Ground/Polished Stone Artifacts		
Axe, full-grooved	-	1
Pestle	1	-
Ulu, combed back	-	1
Plummet	-	1
Carved Stone	1	-
Total	2	3

Beaver Pond South Knoll

The Beaver Pond South Knoll site is located on a wooded knoll at the south end of Beaver Pond. The Caterinas excavated small sections on the low terraces at the base of the knoll and in the valley areas between several ridges. Diagnostic artifacts from this site only constitute 1% of the total collection. This site, which includes a possible Adena-Like point, has the most potential for reconstructing the prehistoric environments and cultural sequences of the area since it probably contains the most intact unexcavated remains. An inventory of recovered artifacts is provided below.

Beaver Pond South Knoll Site Inventory

	Joseph Caterina	John Caterina
Points		
Neville Variant	-	1
Archaic Stemmed	-	2
Small Pentagonal	-	1
Small Triangle	-	2
Adena-Like	-	1
Woodland Lanceolate	-	1
Woodland Stemmed	-	1
Total	0	9

A UNIQUE ARTIFACT

One final artifact from the Caterina collection is included at the end of this report because of its uniqueness. The artifact cannot, however, be assigned to a specific site but was found within the Beaver Pond area. The artifact shown in Figure 4-M is most likely a pendant. It contains a beveled perforation and is made of a brownish gray siltstone or argilliceous material. One side contains a series of radiating lines or branches which all originate from the perforation hole (Fig. 20-A). The reverse side contains a small incomplete drill hole that does not penetrate the piece (Fig. 20-B).

The incised branching lines, tree-like in appearance, were made with a sharp narrow object, perhaps a flake. The lines are thin and very shallow, cutting less than a sixteenth of an inch into the stone. All of the surfaces of the stone or pebble are smooth and rounded but it is not certain whether the object was manufactured this way or if the rounding is the result of water action prior to the design's incision. Similar water-worn slate pendants have been identified throughout Massachusetts (Largy 1985).

The pendant is one of three artifacts from the collection that show stylistic and nonfunctional attributes. The other two items are an incised atlatl weight fragment (see Fig. 18-B) and a carved smooth black stone, both inventoried earlier in this report. Incising with a sharp tool was not uncommon to the prehistoric inhabitants of the Beaver Pond area. Thin scratch marks or incisions were also recognized on the ulu from the Caterina Site (see Fig. 19-C). In some cases, these linear marks may be the result of manufacturing processes, especially during the final finishing stages of smooth slate-like implements such as ulus and atlatl weights.

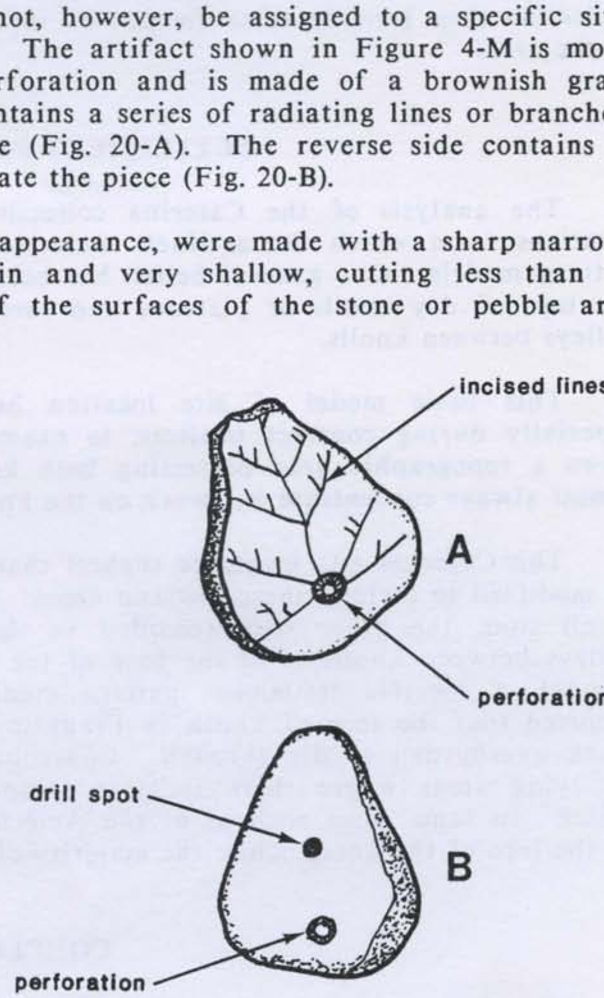

Figure 20. Siltstone Pendant (actual size). (A) dorsal side; (B) ventral side.

COLLECTION SUMMARY

It should be remembered that the artifacts recorded from the Caterina collection do not represent the total materials that were recovered. At least four additional collecting locales were found by the Caterinas but these contained only relatively small numbers of artifacts and are not recorded herein. Many of the projectile points from the Beaver Pond area, especially quartz Small Triangles, were given away. Projectile points that could not be assigned to a specific site were also omitted from this study. Several of the sites recorded in this report have potential for nomination to the National Register of Historic Places. These include the Knoll Dump and American Felt sites. Several of the other sites may also contain significant data for our understanding of the past but further investigation would be necessary in order to determine the proportions of those sites that remain intact.

The ridges, knolls, valleys, and flats surrounding Beaver Pond were heavily occupied throughout the Middle and Late Archaic periods. Further study may be needed to determine why this area was apparently so attractive to prehistoric peoples. The Caterina collection does provide some amount of information about prehistoric settlement patterns in the area.

SETTLEMENT PATTERN MODELS

The analysis of the Caterina collection and the examination of the various site locations from which the artifacts were derived, sheds new light on current settlement pattern models. Our general belief has been that prehistoric sites are usually located on the tops of dry knolls or plateaus and rarely, if ever, are they found on slopes or the valleys between knolls.

This basic model of site location has often limited our archaeological testing, especially during contract projects, to examining dry knoll tops and level plateaus. If given a topographic area possessing both knolls and lowland valleys between them, we almost always concentrate our work on the knolls.

The Caterina site locations suggest that our intuitive settlement model may have to be modified to include these lowland areas. Except for the Knoll Dump and Beaver Street Knoll sites, the other sites recorded in this report were situated either in the small valleys between knolls or at the base of the knolls. These sites were found, however, not through a specific settlement pattern model but due to practicality. The Caterinas reported that the tops of knolls in Franklin are very gravelly, and therefore there is too much overburden to dig through. Consequently, they prefer excavating the bottoms or low-lying areas where there is more topsoil and less gravel and where excavation is easier. In some cases such as at the American Felt Site, very few artifacts were found on the tops of the knolls while the majority of remains came from the valleys between.

CONCLUSIONS

The Beaver Pond study provides an example of how cultural resource management studies can add to our understanding of prehistory. The cooperation of amateur archaeologists, developers and engineers, and professional archaeologists, has led to an important examination of the past 9,000 years of Franklin's prehistory. Although uncontrolled excavation of sites destroys untold amounts of vital data, the careful recording of the provenience of all artifacts from both surface and subsurface contexts can be used to reconstruct the prehistoric development of an area. It is hoped that this study will serve as a model for the type of careful background research that should be conducted for Phase I cultural resource surveys. The benefits of such research are made plain in this report.

Acknowledgments. The author wishes to express his thanks to several individuals who contributed to this report. The Office of Public Archaeology (OPA) at Boston University provided the support for conducting this study as part of the background research for the Intensive Archaeological Survey of the Shepard's Brook Interceptor. Dr. Ricardo Elia, Director of the OPA, was principal investigator for the intensive survey and suggested this study to the author. Camp Dresser and McKee, Inc. of Boston provided funding for the intensive survey. The Caterina brothers took the author to several of their sites in the Beaver Pond area and allowed me to catalog and photograph their collection. Brendan McDermott of the OPA staff prepared the graphics and proofread the manuscript. Sincere thanks to all of these individuals for their contributions.

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ERRATUM, by Curtiss Hoffman: In an article entitled, "Figure and Ground: The Late Woodland Village Problem as Seen from the Uplands" (*Bulletin of the Massachusetts Archaeological Society* 50:26), I erroneously stated that the only exotic found at the Hanson Tree Farm site was a European gunflint. According to Bill Hallaren, who excavated the site (Hallaren 1988, *Prehistoric Indicators from Southeastern Massachusetts: 10,500 to 8,000 B.P.*, Scituate Historical Society, Scituate MA), the artifact in question was a strike-a-light made of French flint. The author wishes to apologize for any misunderstanding resulting from this erroneous identification.
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WHAT IS A C.A.P.I.?

Jonathan W. Pyle

C.A.P.I. is an acronym. Pronounced CAP/E, these letters stand for Computerized Archaeology Periodical Index. The author, a librarian, created such an index to help the staff in the Clarence L. Hay Library of the Cape Cod Museum of Natural History in Brewster, Massachusetts, provide their patrons easy access to articles published in a variety of archaeological serials.

A kind of card catalogue, the C.A.P.I. provides the library's access for archaeological periodicals. Information from an index of 3x5 cards was entered into an IBM PC data base via a FILE EXPRESS (Express Ware Corp., POB 230, Redmond, WA) program. Later, by pushing a computer key, specific information could be retrieved for a user. The Computerized Archaeology Periodical Index would greatly benefit small groups of amateur archaeologists. What a marvelous way for such organizations to manage the volume of non-book literature their discipline continually generates.

The following steps can prove useful in building a C.A.P.I.:

1) Find a librarian to catalog the C.A.P.I.
2) Define the scope of the C.A.P.I.
3) Build the C.A.P.I. in a college, museum or school library.
4) Use the institution's technical services when deciding on subject headings.
5) Collect archaeological serials and decide what articles are suitable for inclusion in the C.A.P.I.
6) Type one author card for each article.
7) Assign subject headings to each article using Reader's Guide to Periodical Literature, Sears List of Subject Headings and, where available, the index from an established archaeological serial.
8) Combine subject headings with few entries into larger ones when possible in order to shorten the list of headings before entering it on the computer. That is, individual headings such as POINTS, ATLATL WEIGHTS, TOMAHAWKS, etc, can be combined into the all inclusive ARCHAEOLOGICAL SPECIMENS. On the other hand, if a subject heading contains many entries, break it up into subheadings.
9) Follow the software input instructions to enter and key card data into the computer.
10) Follow software output instructions to retrieve data. The subject headings will appear in an alphabetized list. The viewer can choose a subject heading, and the computer will print an alphabetized list of authors, with title and periodical, relevant to that subject.

An index placed on computer should be possible with other computers and programs than are mentioned here.

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PROBOSCIDEA IN MASSACHUSETTS

Jerome P. Dunn

Few people are aware that Massachusetts was home to mastodonts and mammoths as recently as 12,000 to 10,000 years ago, in the same time period that we find evidence for the first New Englanders. The purpose of this essay is to collect scattered information on a number of mastodont and mammoth remains which have been found in Massachusetts and off our coasts. Good references on the Proboscidea are Proboscidea in two volumes (Osborn 1936, 1942), and "New World Mammoth Distribution" (Agenbroad 1984). Visits to museums displaying mammoth and mastodont remains have also provided much information.

MASTODONTS AND MAMMOTHS.

Mammut americanum (Kerr) belongs to the family Mammutidae and is called a mastodont. Mastodonts should not be confused with mammoths, Mammuthus, which belong to the family Elephantidae. Mastodonts had migrated from Siberia to Alaska by about thirteen million years ago; only one species, Mammut americanum, existed during the late Quaternary. Mammoths, however, migrated from Siberia to Alaska only during the past two million years, and the Mammuthus species - columbi, jeffersonii and primigenius, have only been in the New World since sometime in the middle to late Pleistocene. Mammoth species names are undergoing revision (Dragoo 1979; Agenbroad 1984:91; Lundelius et al. 1983).

The most significant difference between mammoths and mastodonts is in the shape of their teeth, Figure 1a and 1b. For the mastodont, the teeth are "covered uniformly with enamel, and furnished with a double row of high conic processes", whereas mammoth teeth are composed of "alternate perpendicular layers of bone and enamel, and are ribbed transversely on their upper surfaces, like those of gramnivorous quadrupeds" (Kerr et al. 1792:116). Mastodont teeth were choppers and crushers suggesting that they were browsers, and mammoth teeth are grinders, suitable for a grassland grazer.

Fortunately, the teeth are the least decayable and most likely portion of extinct Proboscidea to be found today. Adult teeth can be 30 cm long and weigh over 3.6 kg.

Figure 1. Schematic drawing of a) mastodont tooth; b) mammoth tooth.

Mastodonts

Mastodont fossils are often found in peat bogs and are well preserved. Consequently, even stomach contents and skin and hair have survived. Striations on the tusks of mastodonts indicate that the tusks were used to dig roots or to scrape the bark off trees or to dig for salt and other minerals (Holman 1988).

The fur of a mastodont, judging from a specimen found in New York, was thick and orange (Scott 1937). According to Osborn (1936), its tusks could be 2.4 m long; bulls could weigh 5.4 metric tons. The body of a mastodont was longer than its height; its head was held lower than a mammoth's in relation to the body. The difference between a mastodont and mammoth skull is most obvious if one compares the mastodont with the mammoth M. primigenius compressus (Osborn). The forehead of the mammoth is perpendicular to the ground whereas the forehead of the mastodont is nearly parallel with it.

Although not as tall as mammoths, who stood about 2.9 m high at the shoulder, mastodonts, with an average shoulder height of 2.4 m, were more massive in the sense that they were broader and supported by thicker bones (Osborn 1936). The legs fore and aft on a mastodont had similar dimensions. The skeleton on exhibit in the Peabody Museum in Cambridge, Massachusetts has a rear end that appears to be just a slight bit higher than its shoulders.

Mastodonts had longer tusks than African elephants have. Male tusks in mastodonts averaged 17.8 cm at their thickest diameter and 2.1 m in length, while female tusks averaged 10.2 cm in thickness and 1.5 m in length (Osborn 1936).

Mammoths

Mammoths were represented in Massachusetts by dwarfed versions of Mammuthus jeffersoni (Osborn) (Oldale et al. 1987). Full-sized M. jeffersoni had bodies equal in length and height, with a pelvis that was slightly lower than its shoulders (Osborn 1936). However, the anatomy of a dwarf may be very different from that of its full-sized ancestors.

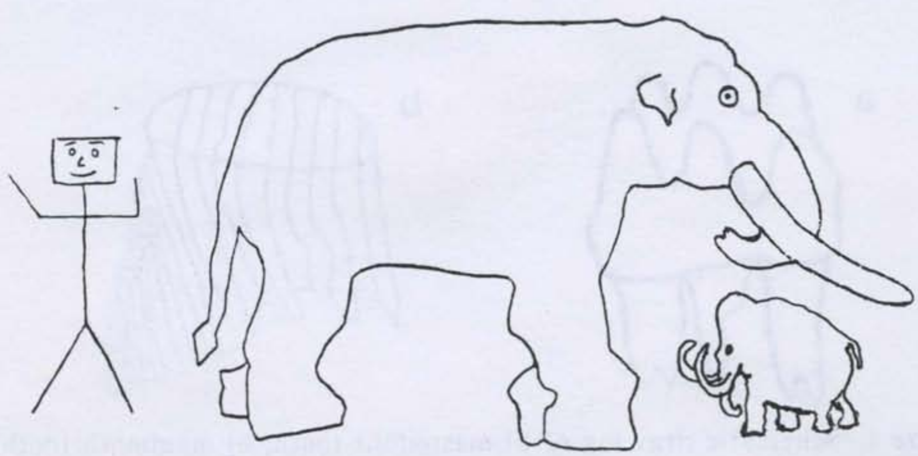

Figure 2. Relative size of, L to R, man, mastodont and dwarf mammoth.

ENVIRONMENTAL SETTING AND CLIMATE CHANGES

Fossils of both mastodonts and mammoths have been discovered in Massachusetts, which lies between 41° 15' and 42° 55' N. After the melting of the Wisconsinan ice in New England, which may have begun at Nantucket and Martha's Vineyard about 17,000 years ago (Oldale et al. 1987), Rogers Lake in southern Connecticut was able to support sedge, lichen and moss by 15,000 years ago (Davis et al. 1980). By 14,000 BP this kind of vegetation had colonized the White Mountains in New Hampshire (Davis et al. 1980). During the early part of the Holocene epoch, sedges were more plentiful than grasses (Edwards and Merrill 1977). Spruce became well established in New England at least as early as 12,500 BP (Davis et al. 1980). Open spruce woodland was the favorite habitat of both mammoths and mastodonts (Osborn 1942). Preserved stomach contents of M. primigenius prove that it ate grasses, sedges and those parts of birch, alder and poplar for which its grinding teeth were adapted (Goldring 1959). A frozen M. primigenius was found in Siberia in the twentieth century with a buttercup in its mouth (Verney 1979). The teeth of dwarf mammoths were capable of munching conifers as well as grazing on grass (Whitmore et al. 1967). The mastodont ate the new growth of white spruce and hemlock, according to specimens whose stomach contents were found preserved (Goldring 1959; see also Barber 1979); it did not have teeth capable of grinding grass.

By 11,500 BP, balsam fir (Abies balsamea) appeared in New England, and between 10-9,000 B.P., pine replaced spruce in New England (Davis et al. 1980). Although it is far from certain how large an effect each factor had, Proboscideae, which disappeared from the Americas circa 10,000 B.P. (Oldale et al. 1987), would not have enjoyed the invasion of Massachusetts by either white pine or early humans, who were at the Whipple site in southern New Hampshire, at the Vail site in Maine and at Bull Brook, Ipswich, Massachusetts, between 11 and 10,000 B.P. (Haynes, Donahue, Jull and Zabel 1984).

MASTODONT AND MAMMOTH DISCOVERY SITES IN MASSACHUSETTS.

On the continental shelf of the northeastern United States, proboscidean fossils have been found by trawlers as much as 300 kilometers from the present shoreline (Dragoo 1979). At the peak of the Wisconsin glacial advance about 20,000 years ago, relative sea-level in this area may have been as much as 100 meters below its modern value (Oldale 1985). On the Continental Shelf off Massachusetts, New York, New Jersey, Delaware and Virginia, 11 mammoth and 31 mastodont teeth have been found (Whitmore et al. 1967). Mastodonts were also abundant on shores of the lower Hudson (Ritchie 1980). In 1987 Kenneth Gomes, a fisherman, brought a molar of M. americanum to the port of New Bedford, Massachusetts. He had found the tooth among scallops which he had just hauled up onto his boat, the "Bountiful," while he was dragging off the coast of New York (Quincy Patriot Ledger 1987).

Georges Bank

Four or more mastodont and three mammoth teeth have been found on Georges Bank, a peninsula of the continental shelf one hundred and seventy kilometers from Cape Cod in Massachusetts (Snow 1980; Barber 1979: Fig. II-24) (Figure 3). The fossils were found by scallop and surf-clam trawlers. The proboscideae on George's Bank may have wandered out on the peninsula during the Wisconsinan glaciation, when much of the continental shelf of the eastern United States was exposed to the air.

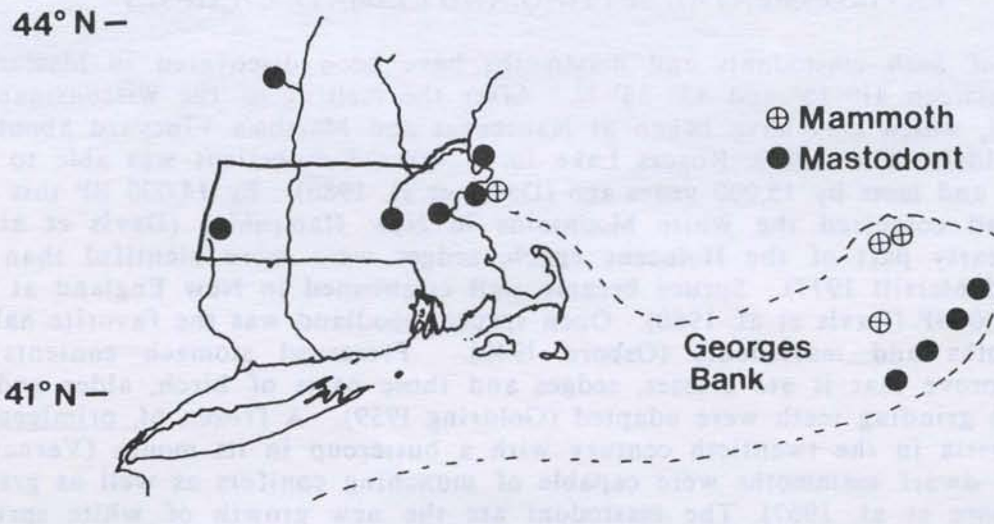

Figure 3. Discovery Sites for Mastodont and Mammoth in Massachusetts (and Mt. Holly, VT) (base map after Snow 1980: Fig. 3.1).

Peat samples taken from the shelf indicate a flora similar to that now found on the mainland as well as the presence of fresh-water ponds and estuaries. Twigs, seeds and pollen of spruce and Abies balsamea have been found in 11,000 year old peat deposits on the shelf (Dragoo 1979).

Massachusetts Bay

The crown of a mammoth tooth and a mastodont tooth were found in Massachusetts Bay off Salem, near a possible drowned shoreline about 50 m below present sea level, by trawlers circa 1975 and 1980 respectively (Oldale et al. 1987). The mammoth crown originally fitted into the left side of the mandible of an adult mammoth, probably Mammuthus jeffersonii (Osborn) and came from the western summit of a bedrock ridge 31 km northeast of Boston and 55 m below today's sea level (Oldale et al. 1987). It shows the abrasion produced by food processing, and it is missing a small portion of its posterior. Dentine was ^{14}C dated by a tandem accelerator mass spectrometer to an age of 10,930 ± 315 years. The owner of the crown had been a dwarf, which suggests that these mammoths may have been stranded by rising sea level on islands where there was a limited food supply (Oldale et al. 1987).

In 1980 a tooth from the left side of the mandible of a mastodont M. americanum (Kerr) was found 8.5 km west of the mammoth tooth. It was found 37 m below present sea level on top of sediments which filled bedrock valleys and created a flat sea bottom (Oldale et al. 1987). According to Oldale, Whitmore and Grimes, the tooth "is not abraded and is essentially intact, including fragile roots" (Oldale et al. 1987). Dentine from the tooth was ^{14}C dated; the tooth is 11,070 ± 130 years old (Oldale et al. 1987).

The mastodont tooth at the Peabody Museum in Salem is without any doubt the best specimen in Massachusetts. It apparently never helped to chew food, because it is unscratched and unbroken. This lack of damage or evidence of use is unusual for a tooth of its size. The tooth may be the largest currently available for display in Massachusetts. It is also an aesthetic ideal. The color of its crown is a pure metallic black, which is

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probably due to fossilization (Oldale et al. 1987), and the distribution of its nipples is harmonic. If one looks at it from a vantage point that is perpendicular to one row of nipples, the other row of nipples is hidden from view.

Ipswich Mastodont

Oldale, Whitmore and Grimes (1987) also mention the discovery of a mastodont fossil near Ipswich, Massachusetts. It is undated.

Spy Pond Mastodont Tusk

In 1960 a 2 m long piece of a proboscidean tusk was found beneath 1 m of water in Spy Pond in Arlington, Massachusetts (Cusak 1968). It is thought to have belonged to a M. americanum. Mastodont tusks could grow to over 3 meters long (Goldring 1959). The University of Pennsylvania estimated by radiocarbon dating that it was 42,072 ± 4305 years old (Cusack 1969). This places its death before the last Wisconsinan ice advance. The piece of tusk is, as I write, on display at the Boston Museum of Science, but it is usually kept by the Arlington Historical Society.

The Northborough Mastodont

In 1884 and 1885 parts of a two-thirds matured M. americanum were retrieved from a bog in the upper Assabet drainage in Northborough, Massachusetts (Hartwell 1979). Twelve teeth were found. Four of these were unruptured replacements. Many of the teeth were juvenile and proved that the mastodont was not fully grown (Allen 1884).

The New England Science Center in Worcester has an exhibit of fragments of bone and tusk along with teeth from the Northborough site. One of the teeth had its enamel converted to odontolite. The tusk fragments are composed of dentine with a 1 mm thick coating of enamel. According to Hartwell, much of the skull of the mastodont disintegrated into powder upon exposure to air, and only thin pieces of skull remain (Hartwell 1979). A hollow bone about 10 cm long and 7.6 cm in diameter has been lost along with a tusk section that was over half a meter long (Hartwell 1979).

The bog in Northborough overlies bedrock and is composed of 0.35 meters of blue clay, 1.75 to 2.1 meters of shell marl, a precipitate of calcium carbonate associated with cold fresh water, and 0.35 meters of peat and a thin topsoil (Hartwell 1979). Usually, proboscidea found in bogs are excavated from the shell marl, but the mastodont in Northborough was found in the blue clay (Hartwell 1979). Fresh-water pollen belonging to fourteen genera of plants was isolated from the blue clay deposit. The pollen producers included Stauroneis, Cymbella and Tetracyclus (Hartwell 1979).

Ivory Pond Mastodont

In June of 1982 on the edge of a bog in Sheffield in the Housatonic River Valley in Berkshire County, Massachusetts, a backhoe uncovered several pieces of bones along with pieces of tusks and fragments of several teeth which once belonged to a M. americanum (Moeller 1983a,1983b,1984; Parrish, Marino and Bulkley 1983). According to Moeller (1984), artificial fill of earth and fiber, with glass and metal fragments, covers a water-saturated peat. Beneath the peat is a layer of fine-grained material, which prevents the water from sinking into a lower gravel deposit. The mastodont fragments were found in the peat along with seeds of Najas flexilis and white spruce (Picea glauca) cones. Najas flexilis is an annual which produces flowers between July and October and grows in shallow fresh water. P. glauca and N. flexilis do not grow near the bog today. Bone gelatin was ^{14}C dated and is 11,440 ± 655 years old. P. glauca cones were also ^{14}C dated and they are 11,630 ± 470 years old. Samples which were dated were not treated with preservatives.

Recovered bones included: 1) a section of the lesser trochanter of a left humerus, 2) the anterior-medial section of the diaphysis of a right humerus 44.4 cm long, and 3) the anterior-lateral section of the left proximal tibia 42.6 cm long. These three pieces of bone were treated with polyethylene glycol, a water-soluble preservative (Moeller 1984). Polyvinyl acetate and Carnauba wax were used as an adhesive for sections of tusk (Parrish, Marino and Bulkley 1983).

> "Because the edges of the fragments recovered do not bear recent breaks, it is assumed that the backhoe removed... bones and ivory which were already broken... The amount of the original surface of the bone still remaining and the absence of evidence of abrasion by sand or gravel suggests that the bone has neither moved a great distance since the demise of the animal, nor was it embedded with water flowing over it" (Moeller 1984).

Regional Museum Displays

A complete skeleton of a mastodont is on display today at the Peabody Museum, Harvard University, Cambridge. It was found in 1846 in Hackettstown, New Jersey (Hall and Hall 1985). The Peabody Museum also has on display a mammoth tooth and a tooth from a mastodont, both unprovenienced (Charles R. Schaff, 1989). The Pratt Museum of Natural History at Amherst College in Amherst, Massachusetts, has on exhibit a mastodont skeleton which was found on St. Helena Island in South Carolina in 1869. The Museum of Science in Boston has the best mammoth tooth, although unprovenienced (Alice Gartzke, Museum of Science 1989), to be seen in Massachusetts. And, finally, Pilgrim Hall, Plymouth, has a mastodont tooth found by Peter Duskis of Wellfleet while fishing off Tom's River, New Jersey.

In 1848 railroad builders discovered the bones, teeth and tusk of a M. americanum in a railroad cut in Mount Holly, Vermont. It had been buried beneath eleven feet of soil and mineral deposits. The fossils, teeth and a tusk are now at the Fleming Museum at the University of Vermont in Burlington.

SUMMARY AND CONCLUSIONS.

All mastodonts and mammoths became extinct by 10,000 years ago. It is probable that prehistoric man in the Americas killed some mammoths and mastodonts (Kirk 1978). However, no stone bifaces or bone tools have yet been found in unambiguous association with ancient Proboscideae in New England. Careful examination of marks on the bones of the Ivory Pond mastodont disproved the hypothesis that these were cut marks (Moeller (1984).

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DIVERSION OF STREAMS TO FURNISH POWER FOR WATER WHEEL MILLS

Stephen Straight

There were two problems facing the small water wheel mill in the early days of America before the days of the big factory. They were 1) having a large enough flow of water, and 2) enough fall in the flow.

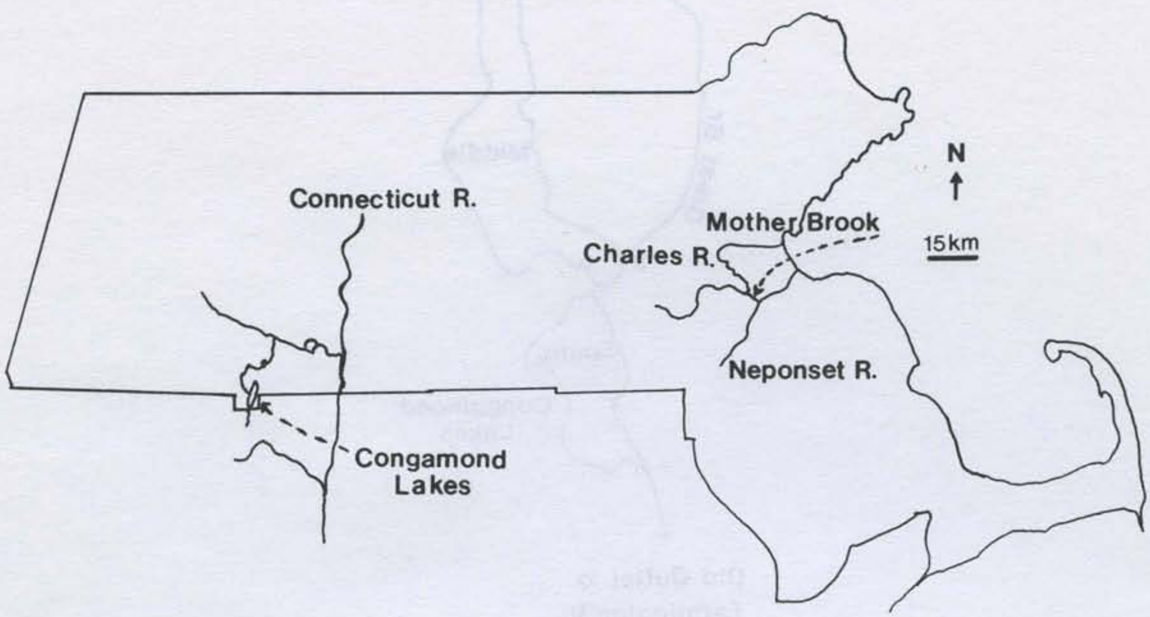

Figure 1. Map of Massachusetts showing Congamond Lakes in Southwick and Mother Brook in Dedham and Hyde Park.

Congamond Lakes, Southwick

To illustrate the first problem of enough flow during all seasons of the year, I will give the example of Congamond Lakes in the town of Southwick, Massachusetts on the border of Connecticut (Figure 1). To insure enough flow during dry weather, dams were often built further up on streams to form reservoirs. The water in them was released during dry spells.

The land around Congamond Lakes (Figure 2), which were formed by the last glaciation, is so level that the water from them could flow in any direction (Billings, G., 1975). That is also why the shores are often so swampy. Originally the outlet from the three lakes was to the south from the southernmost lake into Manitook Stream in Connecticut and then via the Farmington River to the Connecticut River. Powder Mill

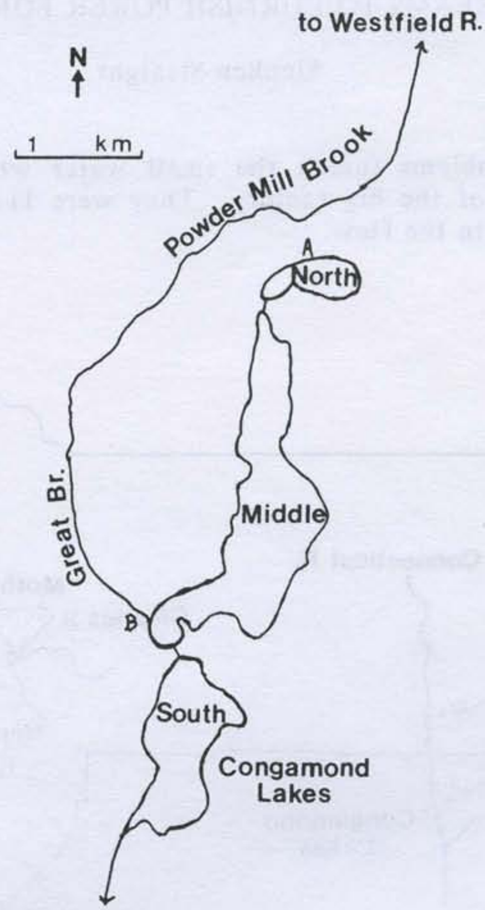

Figure 2. Congamond Lakes, showing location of old hydraulic control structure (A), outlet into Great Brook today (B) and old outlet into Farmington River, Connecticut.

Brook, which was a brook at the north of North Pond, needed more water to run powdermills, so around 1750 the water from the lakes was diverted to the Powder Mills through its present outlet from the middle lake into Great Brook, which circles around North Pond until it reaches Powder Mill Brook (Southwick 1970; Leaflet 1959).

I have a letter from the Corp of Engineers in Waltham, Massachusetts stating that prior to the flood of August 18-20, 1955, a hydraulic control structure existed on the northwest side of North Pond (A in Fig.2), discharging water to the north via a small canal into Powder Brook. This small canal was only used to regulate the level of the lakes or to furnish extra water when needed (Manley 1983). However, this control structure was washed out during the flood in 1955. The Commonwealth of Massachusetts in an emergency dammed North Pond at the wash-out because the whole north lake had disappeared. Today the levels of the lakes are controlled by a box culvert with stoplogs on the southwest corner of Middle Pond (B in Fig. 2). Discharges are carried via Great

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Brook, first west, then north to the Westfield River and then east to the Connecticut River (Leslie 1973).

Middle Pond and South Pond were prevented from going out during the 1955 hurricane by the sand bagging of the culvert between North and Middle Pond. It took North Pond two years to return after the dike was rebuilt (Prift 1974).

Early in the 1800's up to 250,000 pounds of gun-powder was produced each year on Powder Mill Brook. The last mill to operate was Mr. Fletcher's Flour Mill, ceasing its activity in 1936 (Leaflet 1959). This was the last of the original five gun-powder buildings and it was left to the mercy of vandalism and weather. It was hit by lightning about 1956 (Blake 1967).

Further, it might be of interest to industrial archaeologists to know that the Farmington Canal from New Haven, Connecticut, to Northampton, Massachusetts, went through Congamond Lakes (Leaflet 1959).

Mother Brook Canal, Dedham

To illustrate the second problem of enough fall in a stream, I will use Mother Brook Canal in Dedham, Massachusetts (Figure 1). When first settled, Dedham found its land flat. There was no water power available on either the Charles River or the Neponset River because of their levelness (AMC 1971). Wind mills were then tried to grind grain, but wind was unreliable. The nearest mill for Dedham was at Watertown, which was too far away and people were tired of using hand mills. Dedham wanted its own watered powered grain mill (Tourtellet 1941:117-118).

It was discovered that during the spring the Charles River periodically overflowed through a swamp into East Brook, which emptied into the Neponset River. There was a drop of 45 feet between Charles River and East Brook. With this good fall, water certainly would flow. There was only a distance of three quarters of a mile for this 45 foot fall (NHS).

Why was Charles River so close and so high above East Brook and Neponset River? It is because the Charles River zigzags and one of the curves comes close to Neponset River. The Charles River takes a most circuitous course of 85 miles to cover 26 miles as the crow flies from its source to Boston Harbor. The reason for the above statement is due to the last glaciation (AMC 1971). Before the last glaciation of New England, rivers ancestral to the Neponset and Charles Rivers flowed south and southeasterly across the land between Milford and Newton (Billings, M.P., 1967). After the ice had left the area, the Charles River captured the pre-glacial rivers and put them into her system, which essentially flows northeasterly. She was able to do this because the glaciers blocked the channels of the old rivers with glacial debris. They also caused steep drops in short distances such as the drop of forty-five feet in three-quarters of a mile between Charles River and East Brook branch of the Neponset River. Similar sites appear all through New England because of the glaciers.

To utilize this fall of 45 feet in such a short distance for their own grist mill, the people of Dedham decided to dig a permanent ditch. Work started the summer of 1639 and was completed by October 1640 (NHS). The name "Mother Brook" was given to the canal because it was the source of the water which ran the mills upon its bank (Smith 1936). The use of the term "canal" is debatable. Even though East Brook is three miles long compared to three quarters of a mile of Mother Brook, eventually Mother Brook's name applied to both. Mother Brook makes Boston and a few other communities an island (Sanford 1973). The curve or neck of the Charles River had another ditch dug across it in 1653, but it had no mills because there is no fall (NHS).

The town of Dedham gave John Elderkin 38 acres for building the much needed mill on Mother Brook. Eventually he got his investment back by selling half interest to Nathaniel Whiting and the other half to the minister and a couple of his friends. Nathaniel Whiting bought out the minister and John's friends, and the mill remained in the Whiting family for five generations. Ezra Morse built a new mill a few miles upstream in 1699. Whiting heirs complained, so the town of Dedham gave Morse 40 acres if he would let his mill fall (Tourtellet 1941:117-118). A total of five mill privileges were granted along Mother Brook. Over the years the old mills fell into disuse or burned and others were built on the five sites. These mills ground corn, fulled cloth, stamped coins, sawed lumber, cut and headed nails, manufactured paper, wove cloth and carpet and made leather (NHS).

I have tried to show how Mother Brook utilizes a steep drop or fall for running waterwheel mills that was not available on either the Charles or Neponset Rivers.

Both Congamond Lakes and Mother Brook had litigation. On the Congamond Lakes during the building of the Farmington Canal there was litigation over whether water should flow north or south. The lawsuit lasted for ten years. By a decision in Connecticut the case of Arnold Edwards of Connecticut against Rockwell of Southwick was decided in favor of Edwards. If this decision had been final, it would have been necessary to remove the dam at the south end of the pond and this would have materially lessened the flow of water feeding Rockwell's Powder Mills. A later decision was in favor of the Southwick parties so that Rockwell controlled the gate at the Dam (Blake 1967).

There was another case of litigation. For one hundred and twenty-seven years after Dedham's Mother Brook was dug, the town of Newton, a few miles downstream, complained that Mother Brook was taking too much water. It was finally settled in 1840 that Dedham could take only one-third of the Charles River's water (Tourtellet 1941:119-123).

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BOOK REVIEW, by Nicholas N. Smith

The Wabanakis of Maine and the Maritimes; A Resource Book About Penobscot, Passamaquoddy, Maliseet, Micmac and Abenaki Indians. 1989. Maine Indian Program of the New England Regional Office of the American Friends Service Committee, Bath, ME.

The Maine Indian Program of the American Friends Service Committee has undertaken a monumental task in the compiling of this 500 page curriculum guide for teachers in Maine and the Maritimes. The book has received a great deal of input from Indians, information molded into shape with guidance from anthropologists. The primary objective is to give the non-Indian student a better knowledge of the people whose forefathers were here to meet the first traders, fishermen, and settlers from Europe.

The teacher should be aware that there is much more material available than this "resource book" mentions. In order to make the subject matter most meaningful to his students, the teacher must search for local resources for pertinent local material. As an example, almost every community had an Indian name, and teachers will need to look for this information in local histories and Eckstorm's "Indian Place-Names of the Penobscot Valley and Maine Coast". The Important Dates Chart is not a complete list of dates. Only three treaties out of 18 are listed. Also omitted was mention of Sockalexis, a Penobscot, one of the greatest baseball players of all time for whom the Cleveland Indians took their name. "Wabib" (Maine State Library Reference Dept.), an extensive Wabanaki bibliography providing annotations, keywords and tribal designations for more than 4,000
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entrees, would be helpful for teachers looking for additional material.

A unique feature of this book is the record that accompanies it. Examples of songs are on one side and language on the reverse side. All the songs were familiar to me and were popular 40 years ago. Most people who know nothing about these songs would appreciate introductory remarks about them. By example, the "Tuhtuwas" was an entertainment for children. The pine needle clusters look like women in long gowns as they "dance" across a board, box, or other material that will vibrate when it is hit with a cadence stick. For adults there is (or was) a women's dance in which the participants imitate the pine needle dancers, a beautiful, stately performance.

In spite of these criticisms the work is a big step in the right direction. Many of the criticisms have been made to show that there is need to continue this worthy project and to give teachers a bit of encouragement to make this curriculum guide a springboard to further study of the Indian heritage of Maine and the Maritimes.

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JEROME PHILIP DUNN has studied Library Science and he has a degree in English. He repairs houses, collects books and grows ginseng and goldenseal.

JONATHAN W. PYLE is a professional librarian. An active member of the Cape Cod Chapter, he is a long-time volunteer at the Cape Cod Museum of Natural History.

MAURICE ROBBINS, past president and editor of the Society and present museum director emeritus, celebrated his 90th birthday this year at the spring meeting.

NICHOLAS SMITH, a 38 year member of the MAS and founding member of the Maine Archaeological Society, is known for his studies of the Wabanaki and northern Cree.

STEPHEN STRAIGHT is a former Connecticut postmaster. He has had 32 articles published and has spoken before the Pioneer America Convention on material folk culture.

ALAN E. STRAUSS received his master's degree from the State University of New York in Binghamton in 1979. He is at present an independent archaeological consultant.

A BRIEF NOTE TO CONTRIBUTORS

The Editor solicits for publication original contributions related to the archaeology of Massachusetts. Manuscripts should be sent to the Editor for evaluation and comment. Authors of articles submitted to the Bulletin of the Massachusetts Archaeological Society are requested to follow the style guide for American Antiquity 48:429-442 (1983). For additional instructions see the Bulletin of the Massachusetts Archaeological Society, Volume 50:76 (1989).

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